

LANDSCAPE AND IRRIGATION DESIGN OF RIGHT-OF-WAYS, RETENTION BASINS, AND PARKS

Technical Design Manual #8



Chandler + Arizona

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Introduction Sheet

Purpose: Establish a standardized set of minimum requirements in accordance with the City of Chandler Code, Standard Details and the Uniform Standards for Public Works Construction and MAG Specifications, for the use as guidelines for landscaping the areas in private and public use.

Contents: Guide for design standards for Parks, Retention Basins, Right-of-Ways, Medians.

Master Plan: These guidelines are for citywide use, except for the downtown redevelopment area.

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LANDSCAPE STANDARDS FOR PARKS AND RETENTION BASINS

SECTION A:

1. CRITERIA FOR LANDSCAPE IMPROVEMENTS

The following basic elements will be included in landscape plans for parks and retention basins located adjacent to arterial thoroughfares:

- A. Minimum Grass Coverage: When a basin is determined by the Director of Parks and Recreation, to be usable for active recreation purposes, the area of grass surface shall not be less than thirty-five (35) percent.

Grass coverage in all other cases will be reviewed on an individual basis with the major determinants being aesthetics and use.

- B. Minimal Planting Bed Coverage: In no case will the planting beds account for less than thirty (30) percent of the total basin area.
- C. Maximum Acceptable Area of Ground Cover Material Other than Plant Life: (Decomposed granite, etc.) shall not exceed thirty (30) percent of the total basin area unless the basin is designed as a low water use desert type.
- D. Paved Pedestrian and Bicycle Ways: Shall be included as needed to provide easy access to schools, parks, shopping, and places where people congregate. The walkways shall be of an eight-foot minimal width.
- E. The requirements for retention basin used for drainage purposes only shall be modified to reflect that use. Most of the standards listed herein will apply.

2. DESIGN CONSIDERATIONS

- A. The contour of the basin shall be irregular in nature allowing the embankment areas to become integral components of the design. A vacillating contour at areas immediately adjacent to long runs of masonry wall will be encouraged as a design detail for added depth and variety of perspective.
- B. Embankments shall not exceed a 6:1 ratio at lawn areas. Specific approval may be given for increased sloping in cases where the increase results in a more pleasing design and does not hamper the functional use of the basin. All instances of increased sloping shall include the following considerations:

1. Public Safety
2. Low Maintenance
3. Erosion Control
4. Transitional Control (walls, bollards, timbers)

C. Low maintenance will be an essential consideration to all design schemes, including the following:

1. Low spreading plant material shall not be placed at areas where it will spill onto sidewalks or adjacent planting beds.
2. Areas of varying composition within the basin, such as where ground cover or planting beds are adjacent to lawn, shall be separated through the use of masonry mow strips.
3. Trees in lawn areas will be planted in thirty (30) inch square mulched beds to allow for ease of cutting.
4. Areas where “nuisance” water enters and accumulates in the basin will have grouted river run or similar stone surface to eliminate perpetual soggy condition and littered appearance. A dry well may be required under certain conditions to reduce the nuisance water problems.

D. Focal points will be established at points of entry to the development. These areas may include features such as: plantings, sitting walls, signet, and benching.

3. PLANT MATERIAL

A. General: Quantities stated here are not intended to be absolute numbers, but rather “rule of thumb” for the designer and reviewer.

Basin designs shall be evaluated on an individual basis, considering quality of design and environmental contribution to the community. Strong considerations must be given to ease of maintenance and low water use designs.

Submittals which reflect a partial effort, such as provision of the required number of trees without design consideration, will be grounds for a request for further study and re-submittal.

B. Tree Material: The minimum allowable number of trees in the basin shall be established at the rate of twenty (20) per acre.

The minimal acceptable size will be fifteen (15) gallons. One species will account for sixty (60) percent of the tree material. The nature of the basin

and design concept will dictate the mix of tree type. Mix of sizes shall be forty (40) percent fifteen (15) gallon and sixty (60) percent twenty-four (24) inch box type.

A mix of size will be desirable where trees are planted in clusters.

Accent planting at points of entry will necessitate the use of twenty-four (24) inch box material.

The minimal allowable size for shrub material will be five (5) gallon.

- C. List of acceptable material: Shall be taken from the low water use plant list contained herein.
- D. Standards: Implementation of all site improvements shall be in accordance with the City of Chandler Code, Standards Details, and the Uniform Standard Specification for Public Works Construction, and Maricopa Association of governments (MAG), 1979 edition revised.

Work covered by the above shall include, but not limited to:

- Site Preparation
- Excavation
- Grading and Drainage
- Lawn Development
- Water Supply and Irrigation
- Tree Planting

Reference and standards for all plant material shall be as per the "Arizona Nurserymen Association Standards for Nursery Stock," current edition.

4. LAWN CONSTRUCTION - MATERIALS

- A. The kind of seed planted shall be appropriate for the planting season and shall be one of the following:

- 1. Winter Lawns

Shall be annual Rye grass (Lotium Multiflorum) planted from October 15 through April 15; shall have a minimum percentage of purity and germination of 95 percent and 88 percent respectively. At the Developer's or Contractor's option, he may wait until April 15 and seed Bermuda grass or plant Rye. If Rye is planted, the Developer must re-seed the following summer. The Bermuda seed shall comply with requirements noted in this manual. The amount of seed shall be based on the application rate specified in subsection 8-B. The seed must be sown prior to final acceptance.

- 2. Summer Lawns

Shall be Bermuda Primayera (Cynondon Dactylon) planted from April 15 through October 15; shall be fancy hulled seed having minimum percentage of purity and germination of 94 percent and 88 percent respectively and a weed seed content not exceeding 0.35 percent.

B. Mulch

Shall be one of the following decomposed stabilized and fortified, treated (nitrolized) wood products with no more than one (1) percent nitrogen after treatment: fir mulch, pine mulch, or redwood mulch.

5. OPERATION AND MAINTENANCE MANUAL

The Operation and Maintenance Manual shall be provided when the City is to assume maintenance. The manual shall include, but is not limited to the following:

- A. One cover page with the projects name, address, contractor, and the consultant.
- B. A table of contents.
- C. Information on the make, model, and operation of the controller(s).
- D. Information on the make, model(s), and operation of all valves, back flow preventers, sprinkler heads, bubblers, emitters, etc.
- E. Information on the location of each station.
- F. A facility information form specifying the following information for each turf station:
 - 1. Station Number
 - 2. Type of Sprinkler Heads
 - 3. Nozzle Size(s)
 - 4. GPM per Sprinkler Head(s)
 - 5. Spacing between Sprinkler Head(s)
 - 6. Numbers of Heads
 - 7. Is the station located on a slope and what is the exposure?
- G. Information on any extra stock to be given to the City.
- H. Information on all warranties of parts.
- I. A list of all plant materials which shall include the following:
 - 1. Botanical Name
 - 2. Common Name

3. Plant Size
4. Quantity
5. Are the plants located in the sun or shade?
6. Type of irrigation to the plant (bubbler, emitter, etc.)
7. How many cycles per week to water for both winter and summer?
8. Length of watering per cycle

J. Square footage on all granite areas.

K. Square footage on all turf areas.

SPECIFICATIONS FOR PARKS AND RETENTION BASINS

SECTION B:

The City of Chandler has developed the following guidelines for minimum improvements of new parks and retention basins. Developers will be required to adhere to this with staff review and inspections as specified.

The Engineer and Developer are advised that all basin development and installation must be completed and accepted prior to the acceptance of the paving by the City for this subdivision.

1. GRADING AND MOUNDING

All finished grades shall be in accordance with approved grading plans. All slopes shall be in accordance with the approved grading plan and the top and bottom of all slopes shall be rounded for a distance of not less than ten (10) feet.

- A. All fills shall be compacted to 85% density in eight (8) inch lifts and brought to optimum moisture content and thoroughly compacted. All rock in any dimension, debris, rubbish, concrete, or asphalt concrete paving shall be removed from the site prior to finish subgrade.
- B. All cuts shall be made in accordance with the plans. All cut areas shall be over-excavated to guarantee the replacement of a six (6) inch thick layer of topsoil.

2. TOPSOIL

All areas to receive grading (cuts or fills) shall be stripped of the topsoil, which shall be stockpiled in an area adjacent to the site. The Developer or Contractor shall be responsible for making arrangements for storage and/or moving of this topsoil prior to its replacement on the site.

3. SOIL TESTING

All areas in which planting is to be done shall have soil analyses performed to determine the soil deficiency and the nutrients needed to sustain and insure healthy plant growth.

4. FINISH GRADING

Upon acceptance of the subgrades by the User Department of the City, the stockpiled topsoil shall be evenly spread over the entire graded area and dragged to uniform planes at proper grades. Sprinkler and utility trenches must be dug, completed, and backfilled prior to the next segment of work. All grades shall be within a tolerance of 0.10 feet, more or less, in flood irrigated areas and 0.25 feet, more or less, in sloping or mounded areas except where adjacent to curbs or sidewalks where the tolerance shall be 1/2 inch.

All areas to be seeded shall be fine graded. All turf areas shall be dragged and raked, removing all clods or rock, one (1) inch in any dimension. All soil shall be thoroughly water settled.

5. SUBMITTAL PROCEDURES, REVIEW, AND SCHEDULING

- A. Pre-Submittal Conference: The Developer shall meet with the User Department to ascertain priorities, discuss intended improvements, and review City Standards and site development requirements.
- B. Conceptual Landscape Study: Conceptual landscape study shall be submitted for review by the User Department as part of the tentative subdivision submittal.
- C. Final Landscape Plan: A final landscape plan, irrigation plan, cost estimate, and development schedule shall be submitted and approved by the User Department prior to the start of any on site improvements.
- D. Start Construction: The contractor shall notify the department, in writing, two weeks prior to the start of work on the basin indicating the date on which work is to commence.
- E. Plant Material: The contractor shall notify the department, in writing, of the source of plant material three weeks prior to schedule planting. The material will be “tagged” and available for inspection at the source. In case of material coming from a source where nursery inspection would be impractical, “on-site” inspection will be conducted upon delivery. Notification of delivery shall be the responsibility of the contractor; substandard material will be rejected at that time.
- F. Inspection: The contractor shall notify the User Department at each pertinent stage of construction to allow for periodic inspection. Any workmanship or materials not meeting City Standards, will necessitate a written notification and correction of the matter before additional work may be done.
- G. Preliminary Acceptance: The contractor shall make a written request for preliminary acceptance of the improvements. Approval of this request shall commence the ninety (90) day maintenance period.
- H. Final Acceptance: The contractor, upon completion of the ninety (90) day maintenance period, shall forward a written request for final acceptance of the improvements. The maintenance period will be extended if necessary, until such time as the improvements are acceptable. The contractor shall forward a mylar print, two (2) microfiche, two (2) irrigation manuals, one (1) operation and maintenance manual, and transfer the utilities to the proper City Department to finalize acceptance of the improvements.

- I. Preliminary and Final Acceptance: Shall only apply when the City is to assume maintenance. In all other cases, the developer will simply request final approval.
6. MOISTURE CONTENT

The soils shall not be worked when the moisture content is so great that excess compaction will occur; nor when it is so dry that a dust will form in the air or that clods will not break readily. Water shall be applied if necessary, to provide ideal moisture content for tilling and for planting herein specified.
7. PREPARATION OF SEEDBED

Where soil analyses show that existing topsoil is satisfactory, a seedbed shall be prepared by scarifying to a depth of at least three (3) inches and dragging to a smooth surface. Where existing soil is caliche type, it shall be excavated to a depth of six (6) inches, removed from the site and replaced with acceptable topsoil. Irregularities in the surface shall be leveled before seeding operations commence.

After raking, roll entire area in two directions at approximate right angles with a water ballast roller weighting one hundred (100) to three hundred (300) pounds. Any irregularities that develop shall be re-raked, scarified for bond, and again rolled until the area is true and uniform and free from lumps or depressions. Water shall be applied to surface whenever necessary to insure proper working of soil. No heavy objects except lawn rollers shall be taken over these areas. Grade and compaction must be approved by the City prior to planting.
8. PLANTING
 - A. Just prior to broadcasting the seed, apply and lightly rake in the surface the following:
 1. 5 pounds Ammonium Sulfate (21-0-0) per 1,000 square feet
 2. 15 pounds Superphosphate (0-20-0) per 1,000 square feet
 - B. After approval of the areas to be seeded by the User Department of the City, the seed will be broadcasted at the rate of three and a half (3 1/2) pounds Bermuda or ten to fifteen (10-15) pounds of Rye seed per 1,000 square feet. One half of the seed will be sown with the sower moving at right angles to the first sowing. Broadcasting shall not be done in windy weather.
 - C. Hydro seed and sodding can be used in lieu of seeding. Preparation of the seedbed must follow the above guidelines.
9. MULCHING

Top dress all seeded areas with an approved wood mulch as specified. Spread mulch evenly over all areas at a rate of one cubic yard per 1,000 square feet or as recommended by the manufacturer, whichever is greater.

Lightly roll all areas and thoroughly water with a fine spray. Turf shall be kept continually moist by watering as often as required.

Any areas that do not root properly shall be replanted at ten (10) day intervals until an acceptable stand of grass is obtained.

10. MAINTENANCE PERIOD - LAWN

- A. The Developer or Contractor shall maintain all turf planted areas for a period of ninety (90) days, beginning immediately after preliminary acceptance by the City.
- B. If all plantings are not acceptable at the end of the maintenance period, the maintenance period shall be continued until the work meets approval by the User Department of the City.
- C. Fertilizing: During the maintenance period, two applications of complete fertilizer (6:10:4) shall be made (at 30 days and 60 days) at the rate of twenty (20) pounds per 1,000 square feet with each application. The User Department of the City shall be furnished with written documentation of the schedule of applications.
- D. Maintenance shall include continuous operations of watering, weeding, mowing, rolling, trimming, edging, cultivating, fertilizing, spraying, insect and pest control, re-seeding, replacement, and/or other operations necessary to assure good normal growth. The Developer or Contractor shall be responsible for applying lawn with control sprays or other materials, as often as may be required to protect turfs during the entire contract.
- E. When the turf has established sufficient root structure and an approximate height of three (3) inches, mowing should begin immediately to a two (2) inch height and shall be mowed thereafter and reduced in safe increments to a height of one (1) inch.
- F. During the installation period and during the maintenance period, the Developer or Contractor shall be responsible for maintaining adequate protection for all areas. Any damaged planting shall be repaired at the Developer's or Contractor's expense.
- G. At termination of each maintenance period all turf shall be live, healthy, undamaged, and free of infestations. All areas shall be completely covered at the time of acceptance, leaving no bare spots larger than three (3) inches by three (3) inches. Inferior plantings shall be replaced and

brought to a satisfactory condition before final acceptance of work will be made.

- H. Replacement: The Developer or Contractor shall immediately replace any and all turf that dies or is damaged. Replacements shall be made to same specifications as required for original plantings.
- I. Two (2) inspections shall be made that affect each maintenance period: The first, after all planting have been completely installed, in order to approve the beginning of the maintenance period of not less than ninety (90) calendar days; and the second, at the end of the ninety (90) day period due to defective maintenance, the maintenance shall be continued by the Developer or Contractor until all work meets the specifications and can be approved.
- J. The Developer or Contractor shall operate and maintain the irrigation system during the maintenance period. Repairing broken mainlines, laterals, sprinkler heads, bubblers, emitter systems, valves and timers, and/or other malfunctions that may occur.

The Developer or Contractor must allow up to three (3) weeks for the City to negotiate a maintenance agreement. The Developer or Contractor must notify the City three (3) weeks in advance of the end of his maintenance period and must also transfer title to the City prior to the City's assuming the maintenance.

11. PLANTING OF TREES, SHRUBS, AND GROUND COVER - GENERAL

All parks and retention basins shall receive a minimum average of twenty (20) trees per acre, based on the net acreage, with a minimum of three (3) varieties and a maximum of seven (7) varieties. One variety must comprise fifty (50) percent of all trees planted. This tree preferably will be evergreen and a fast growing variety. Mix of tree sizes shall be forty (40) percent fifteen (15) gallon and sixty (60) percent twenty-four (24) inch box type.

12. QUALITY AND SIZE

All trees shall be a minimum size of fifteen (15) gallons; shall have sufficient roots to hold the earth together after removal from the containers, but shall not be root-bound. Plants shall have been grown in pots, cans, or boxes for a minimum of three (3) months and a maximum of one (1) year.

All plants shall have a normal habit of growth and shall be sound, healthy, vigorous, and free from disease, insect infestations or weeds.

Trees shall have a straight trunk throughout their height and shall be in accordance with the Arizona Standard for Nursery Stock.

13. NOMENCLATURE

For inspection and identification, durable legible labels, stating in weather-resistant ink, the correct plant name and size, as specified in the plant list, shall be securely attached to all tree trunks delivered to the site.

14. MATERIALS FOR PLANTING

- A. Manure (for mulch): Shall be well-rotted, unleached stable or cattle manure, reasonably free from shavings, sawdust or refuse and shall contain not more than ten (10) percent straw by volume.
- B. Humus (for prepared soil): Shall be sterile peat or peat-moss or decomposed stabilized and fortified, treated (nitrolized) wood mulch, with no more than one (1) percent nitrogen after treatment and shall be fir mulch, pine mulch, or redwood mulch type.
- C. Mulch (in planting basins): Shall consist of twenty-five (25) pounds of soil sulfur throughout the tree basin to a depth of two (2) inches.
- D. Prepared Soil (for backfilling tree pits): Mix three (3) cups soil sulfur per fifteen (15) gallon tree, five (5) cups per twenty-four (24) inch box tree. Mix sulfur with planting mix; which shall be one (1) part imported topsoil to one (1) part mulch and one (1) part sand. Topsoil shall be natural, fertile, friable soil which shall not be excessively acid or alkaline nor contain toxic substances harmful to plant growth and be reasonably free of noxious weeds, clay clumps, clods, stones, roots, stumps, and debris of any kind. All imported topsoil shall have soil analyses before it can be incorporated on the project.
- E. Staking Materials:
 - 1. Stakes for supporting trees shall be (2) 8' lodge poles for fifteen (15) gallon trees (10' for Eucalyptus), (2) 12' lodge poles for 24" box trees. Stakes to be placed outside of tree pit (see Sheet No. 1).
 - 2. Tie wire for fastening trunks to stakes shall be No. 12 gauge, annealed galvanized steel (not iron). One wire shall be placed at the top of the stakes and another six (6) inches below it, or as needed to ensure a straight and healthy trunk. (see Sheet No. 1).
 - 3. Hose to protect trunk from wire shall be new two (2)-ply reinforced rubber or plastic garden hose. (See Sheet No. 1).
 - 4. If necessary, staple or tack-wire to stakes to hold firm.
 - 5. Install Arbor Guards to all newly planted trees.

15. PLANT MATERIAL

- A. Unless otherwise indicated, all plant materials furnished shall be nursery-grown, well branched, and well proportioned. All plants are subject to inspection and approval before planting, whereupon all plants found unsuitable shall be removed and replaced.
- B. Substitutions: Plants of kinds other than those indicated on the plant list will be considered by the User Department of the City only upon submission of proof that any plant is not reasonably procurable in the local region and upon prior authorization by essential characteristics as the kind of plant specified in regards to appearance, ultimate height, shape, habit of growth, general soil, and other requirements. In no case, shall the average cost and value of the submitted plants be less than the cost and value of plants indicated.
- C. Protection After Delivery: Upon delivery to the site, all nursery stock shall be planted as soon as possible. Until planting, stock plants shall not be exposed to excessive sun or drying winds during planting operations.

16. SETTING PLANTS

Unless otherwise specified, all plants shall be planted in pits and shall be set so that the finish grade level after settlement will be the same as that at which plants were grown. They shall be planted upright and faced to give the best appearance and relationship to adjacent plants or structures. All trees shall be set plumb and rigidly braced in position until the soil has been tamped solidly around the ball. Plants shall be backfilled with planting soil which shall be thoroughly settled by watering and tamping to fill all voids. A water basin shall be created at the base of each tree and shall be a minimum of five (5) inches deep and four (4) feet in diameter (see Sheet No. 1).

All slopes shall be contoured in such a manner not to exceed a 4:1 grade. Especially, where trees are to be planted (see Sheet No. 3).

17. CLEAN UP

Any soil, manure, or other material dropped onto paved areas by hauling operations or otherwise, shall be removed promptly, keeping these areas clean at all times. Upon completion of planting, all excess soil, stones, and debris not heretofore disposed of under this scope of work, shall be removed from the site or disposed of as directed by the Engineer.

18. MAINTENANCE PERIOD - PLANTS

- A. The Developer or Contractor shall maintain all trees for a period of ninety (90) days beginning with the preliminary acceptance by the City. If all trees are not healthy at the end of the maintenance period, the maintenance shall be continued until the trees meet the approval of the City, and/or are replaced.

- B. Plant Guarantee and Replacement: The Developer or Contractor shall guarantee all plant material to be in a vigorous, healthy condition for a period of one year from the date of acceptance or replacement and shall guarantee to replace any plant material which proves to be not true to name, regardless of the length of time it takes to make this determination.

19. IRRIGATION SYSTEMS

A flood irrigation system may be allowed for flat level areas, with approval. An automatic sprinkler irrigation system must be used for all areas not covered by flood irrigation which will be developed as turf. An automatic irrigation system shall be used for all desert type areas.

The User Department of the City will review and approve all irrigation systems prior to any installation. All sprinkler systems shall be automatic, and shall utilize a pressure type vacuum breaker or reduced pressure back-flow preventor (per manufacturer's recommendations) before the electric control valves. All applicable codes shall be adhered to and a permit will be required. All plans submitted for approval must specify the brand, model, and nozzle size(s) of the heads. The brand, model, and size of all electric valves; and also the brand and model number of the electric controller, the brand, model, and size of the vacuum breaker, (see Sheet No. 8). Also to be submitted are all the pertinent data on such miscellaneous items as valve boxes, covers, size and type of pipe. In addition to all the necessary details, and friction pressure loss calculation for the longest run in the system for both full circle circuits and part circle circuits (see Sheet No. 8). The City will furnish the Developer or Contractor with City water pressure data on request.

20. WATERING CYCLE

- A. Complete watering cycle for turf areas and shrub sprays, shall be completed within eight (8) hours. Any drip system must be completed within two (2) hours after the turf and shrub spray areas are completed.
- B. Minimum water application rate per week, for Bermuda shall not be less than 0.75 inches and not more than 2.75 inches per week.
- C. Length of watering cycle and application rate per week shall be noted on sprinkler irrigation plans.

21. EXCAVATION, BACKFILLING, AND COMPACTION

Trenches for main lines shall be excavated to a minimum depth of eighteen (18) inches and a maximum depth of twenty-four (24) inches. Control wiring shall be a minimum depth of sixteen (16) inches and a maximum depth of two (2) inches above the main line. Lateral lines shall be a minimum of twelve (12) inches and a maximum of four (4) inches above the control wiring. When in common trenches, the main lines shall be laid first, to be followed by a minimum of two

inches of fine backfill; then the control wiring, which must be taped and bundled every ten (10) feet. It is then followed by a minimum of four (4) inches of fine backfill; then the laterals and final backfill and compaction. All must be in accordance with Section 601 of the Standard Maricopa Association of Governments Specifications for Public Works (See Sheet No. 9).

22. EXISTING UTILITIES AND STRUCTURES

The Contractor shall protect existing structures and utility services and be made responsible for their replacement. Minor adjustments in the system will be permitted to clear existing obstructions subject to the approval of the City.

23. MATERIALS

Once the City has approved the plans, no substitutions shall be allowed, except when unavailable from the supplier and another approved product is locally available. The City must approve all such substitutions in writing. All materials shall be new and the best of their class and kind. All materials and workmanship shall be guaranteed for a period of one (1) year from the time of City acceptance against material defects and workmanship.

24. INSPECTIONS

The City's individual User Department will inspect and approve the work at the following stages of completion. Any work completed without these inspections must be removed prior to acceptance of that phase of work. These stages are:

- A. Completion of all trenching and installation of all main lines prior to back-filling, including the vacuum breaker, quick couplers, electric valves and any isolation valves. The main line shall be pressure tested for thirty (30) minutes at this inspection.
- B. Completion of installation of all control wires prior to back filling.
- C. Installation of all lateral valves, lines, and heads prior to back filling.

25. FLUSHING AND TESTING

After all new sprinkler piping and risers are in place and connected and all necessary division work has been completed and prior to the installation of sprinkler heads, control valves shall be opened and a full head of water used to flush out the system. After the system is thoroughly flushed, risers shall be capped off and the system pressure tested prior to backfilling the laterals.

26. AS-BUILT DRAWINGS

The Developer or Contractor shall be responsible for providing one (1) transparency print and two (2) microfiche of the system with all changes in location marked on the print. This shall be given to the City prior to final acceptance. No final payment will be made until the as-built drawings have been received by the City.

27. CONTROL CABLE

All wiring to be used for connection of the automatic controller to the electric solenoid actuated remote control valves shall be equivalent to Type UF-600V, 7 strand or solid copper, PVC insulation, single conductor, UL approved underground feeder cable. All pilot or hot wires are to be one color and all "common" wires are to be white. Wiring shall conform to local codes and shall be installed according to the manufacturer's recommendations. Minimum wire size shall be No. 14. All wire connections must be made with an epoxy filled cylinder type wire connector.

28. PIPE

- A. All pipe (PVC and Copper) shall be properly sized on the drawings.
- B. No galvanized pipe shall be used. Schedule 80 PVC nipples shall be used for sprinkler swing joints and Type K hard copper shall be used for all main line piping above grade, and extending a minimum of eighteen (18) inches and a maximum of twenty-four (24) inches below finished grade.
- C. Plastic PVC lines below paving shall be installed within separate schedule forty (40) sleeves. For PVC lines 1" to 2 1/2" the sleeve shall be two (2) nominal sizes larger. For PVC lines 3" and larger the sleeve shall be one (1) nominal size larger. Sleeves for water lines shall not exceed manufacturers recommended deflection for encased water line.
- D. All pipe (PVC or Copper) installed in rocky or caliche soils shall be thoroughly embedded and completely covered in sand or approved imported topsoil.
- E. Plastic pipe shall be as described on the drawings. It shall be unplasticized PVC extruded from virgin parent materials of the type specified on the plans. The pipe shall be homogeneous throughout and free from visible cracks, holes, foreign materials, blisters, deleterious wrinkles, and dents.

All pipe shall be continuously and permanently marked with the following information: Manufacturers name, size, schedule, type of pipe, working pressure at 73 degrees Fahrenheit, and N.I.S.F. approval.

29. PLASTIC PIPE, FITTINGS, AND CONNECTIONS ON MAINS

All pipe and fittings shall be approved type 1, grade 1, PVC, PR 200 pipe conforming to A.S.T.M. D1784-65T and D2241-L65T, and shall be either solvent weld pipe or rubber ring joint pipe. When a connection is plastic to copper either a PVC Schedule 80 nipple or male adapters shall be used. The male adapter shall be hand tightened, plus one turn with a strap wrench. Joint compound shall be virgin teflon paste or tape.

30. PLASTIC PIPE, FITTINGS, AND CONNECTIONS ON LATERALS

All pipe shall be as follows:

1/2 inch - PR 315, PVC
3/4 inch and 1 inch - PR 200, SDR 21, PVC
1 1/4 inch and up - PR 160, SDR 26, PVC

All fittings shall be molded fittings manufactured of the same materials as the pipe and shall be suitable for either solvent weld or screwed connections. Use male adapters as described above. Only Schedule 80 PVC pipe may be threaded.

31. INSTALLATION OF PLASTIC PIPE

Plastic pipe shall be installed in a manner so as to provide for expansion and contraction as recommended by the manufacturer. Plastic pipe shall be cut with a hack saw or approved cutting device or in such a manner so as to ensure a square cut. Burrs at cut ends shall be removed prior to installation so that a smooth, unprotected flow will be obtained. A PVC primer shall be used on all main lines (according to manufacturer's recommendations). Pipe for use with rubber gaskets shall use a gasket lube, Weld On 787 or approved equal and shall be tapered as recommended by the manufacturer.

32. REMOTE CONTROL VALVES AND VALVE BOXES

Remote control valves shall be normally closed 24 volt a.c. 60 cycle solenoid actuated globe/angle pattern diaphragm type. The valve body and bonnet shall be constructed of either heavy cast brass or heavy duty glass-filled nylon. Solenoid coil shall be encapsulated in molded epoxy. The valve shall have a flow control stem with wheel handle for regulation or shutting off the flow of water and a bleed screw for manual operation without electronically energizing the solenoid. The valve construction and installation shall be such as to provide for all internal parts to be removable from the top of the valve. The valve shall be either Rainbird or approved equal and shall be installed per manufacturer's recommendations (see Sheet No. 10). Ball valve isolation valve, the same size as electric valve should be installed before each electric valve.

Valve boxes shall be vandal and water proof with locking bolt lid.

33. BACKFLOW PREVENTERS

The backflow preventer body and bonnet shall be constructed of bronze, the hook and spring of stainless steel, the float of polyethylene, and the vent and check discs of silicone rubber. The backflow preventer assembly shall include two ball valves for isolating unit and two test cocks for testing the unit to insure proper operation (see Sheet No. 11 and 12). All backflow preventers are to have a vacuum breaker cage (see Sheet No. 13).

The backflow prevention assemblies shall be selected from the most current list of approved assemblies published from the Foundation for Cross-Connection Control and Hydraulic Research, (F.C.C.C. & H.R.) of the University of Southern California and has a local parts and service center.

Upstream piping from the backflow prevention assembly shall be flushed in a manner that will not lodge dirt, rocks, and debris in the assembly itself.

Prior to final acceptance of the irrigation systems, each backflow prevention assembly shall be tested by a certified and approved backflow prevention assembly tester, to ensure the device is operating correctly within manufacturers recommendations. A list of approved testers may be obtained from the City. Test reports shall be sent to the Water Operations Division of the City of Chandler, Public Works Department. An approved test report form may be obtained from the City.

Those devices not meeting test requirements shall be repaired and re-tested prior to final acceptance. In the case where reduced pressure principle assemblies are used, a splash pad shall be used under the relief part for discharge water. An acceptable method of handling discharge water from the device must also be approved prior to the installation of such a device.

34. SPRINKLER HEADS

A. The following manufacturers and models are acceptable:

1. Rainbird model: 1800
2. Hunter: Institutional Series

B. All heads of a particular type of function in the system shall be of the same manufacturer and shall be marked with the manufacturer's name and identification in such a position that they can be identified without being removed from the system. All sprinkler heads, which are to be installed in lawn areas where the turf has not yet been established, shall use a rotor dam or be set one (1) inch above the proposed finished grade. Heads installed in this manner will be lowered to grade when the turf is sufficiently established to allow walking on it without appreciable destruction. All nozzles on rotary pop-up sprinklers shall be tightened after installation. All sprinklers having an adjustment stem shall be adjusted on a lateral line for the proper radius, diameter, and/or gallons.

Two vandal resistant screwdrivers shall be supplied to the City (see Sheet No. 14).

C. SWING JOINTS

All sprinklers and quick coupler valves shall be installed on swing joints, consisting of two (2) lengths of PVC schedule 80 nipples (6 inch long) attached with two (2) PVC street ells (mipt by fipt) and one (1) PVC ell (fipt by fipt) with a minimum of thirty (30) degrees and a maximum arc of sixty (60) degrees (see Sheet No. 15 through 17). Pre-manufactured swing joints can also be used.

35. ELECTRIC CONTROLLER

The sprinkler controller shall be capable of operating on 117 volts, 60 cycle A.C. current and shall provide output current of 24-26.5 volts at 1.1 amps for electric solenoid valves. Controller shall be mounted in a security cabinet (see Sheet No. 19). Controller shall be sized to perform the sprinkling efficiently and adequately. All controllers shall be installed with a rechargeable NiCad battery.

The following manufacturers and models are acceptable: Irrinet, Motorola MIR5000I, or Scorpio Unit.

All controllers shall be equipped with a Rainmaster plug-type harness for a remote control attachment. Wiring shall correspond to the geographic location of the valve and station controlled. The coordination of wiring systems shall be approved by the City, prior to final acceptance.

36. BRASS BALL VALVE

Shall have forged brass body, threaded cap, blowout proof stem, reinforced glass fiber filled PTFE seats, quarter turn handle, NPT threaded or soldier joint ends.

Every electric remote control valve shall have one ball valve on the pressure side as an isolation valve. Ball valve to be the same size as the electric remote control valve (see Sheet No. 20).

Every backflow preventer shall have two ball valves same size as the backflow preventer (see Sheet No. 11).

37. CHECK VALVES

A. Check valves two (2) inch and smaller shall be swing type, bronze bodied with threaded connections and replaceable composition disc, rated at 150 pounds S.W.P.

B. Check valves 2 1/2 inch and larger shall be swing type, iron body, bronze mounted with flanged or threaded connections and replaceable rubber disc, rated at 125 pounds S.W.P.

38. MASTER VALVE - FLOW SENSOR

Each facility will have a master valve and flow sensor located directly after backflow device. Master valve can be same product as states in #32. Flow meter shall consist of data industrial 220 or 250 model transducer along with 600-10 converter module. Bermad 910-P hydrometer can also be used.

- A. Meter to vacuum breaker - schedule 40 PVC or Type K soft copper.
- B. Vacuum breaker risers - Type K hard copper.
- C. All other exposed pipe to booster pump, (if required), Type K hard copper.
- D. All buried main and laterals downstream of vacuum breaker - PVC pipe as outlined under items No. 28 through 31 of this section.

39. WATER FOR TREES

All trees shall receive water from one of the following systems:

- A. An emitter system with electric solenoid valve, Y-strainer and pressure regulating valve.
- B. A bubbler system with electric solenoid valve, PVC pipe with bubbler installed (see Sheet No. 21).

40. BOOSTER PUMPS

If a booster pump is used it must be enclosed within a six (6) foot high slump block wall along with the controller, the backflow preventer and all electric controls. Access is to be a six (6) foot chain link gate with a lock. The City will assist in the selection of an acceptable booster pump. If a booster pump is used, a reduced-pressure backflow preventer will be required in lieu of a pressure type vacuum breaker.

41. DRIP SYSTEMS

A drip system shall be installed in such a manner that the emitters and smaller tubing are to be below grade and vandal resistant.

LANDSCAPE STANDARDS

FOR RIGHT-OF-WAY AND MEDIANS

SECTION C:

1. CRITERIA FOR LANDSCAPE IMPROVEMENTS

The following considerations shall apply with regard to the development of landscape improvements for roadway right-of-ways and medians that are to be maintained by the City of Chandler.

A. PURPOSE

These landscape standards have been assembled to establish guidelines for the design and development of roadway landscape medians and roadway frontages within City of Chandler public right-of-ways. These standards are not intended to provide design solutions or treatments for all public right-of-way landscape areas or address site specific conditions. The primary purpose for these guidelines is two-fold. First, they are to establish a framework of design criteria and parameters to ensure a comprehensive and unified approach to right-of-way streetscape/landscape enhancement. Their secondary purpose is to provide the design consultant a recommended guideline and reference for standardization of materials, equipment selection and installation details that are in accordance with the standard of quality required by the Public Works Department/Street Division for all right-of-way streetscape/landscape within the City of Chandler.

B. STREETSCAPE

In general, the term streetscape refers to the many visible surface elements that make up a typical roadway environment. However, due to the fact that many of the visible elements are directly affected by the requirements of their below grade portion or the requirements of other elements located below ground, the designer must consider both the surface and sub-surface elements as part of the total streetscape. Typical streetscape elements include: vehicular and pedestrian pavements, surface and sub-surface utilities, grading and drainage, lighting, walls, signage, and landscaping.

C. STREETSCAPE CHARACTER/IMAGE

Streetscapes are the signature feature of various communities throughout the City of Chandler. From the major highways to residential streets, the visible streetscape establishes an image or character of the adjacent community for both residents and visitors. A well coordinated and unified streetscape will not only enhance the visual quality of the adjacent community, but will also provide a continuity and help to improve the

image and character of the overall City. Although not always aware of it, the general public is influenced by the aesthetic appeal provided by streetscape design as well as how it supports or fits the vision of their community.

Streetscape design should consider the local context of the roadway as well as unique features and focal points of the adjacent community. Streetscape design can be beneficial toward the enhancement of the positive community features and reducing awareness of undesirable features.

Streetscape design within public right-of-ways should consider views of the immediate streetscape from the perspective of the vehicle and pedestrian users as well as views between the roadway and the adjacent community. Where distant views offer visual access to scenic or significant features, these views should be maintained or enhanced whenever possible.

D. LANDSCAPE MATERIALS

Landscape materials for use within the public right-of-way shall consist of the following:

1. Plant Materials

Plant materials shall consist of ground cover plants, ornamental grasses, succulents, cacti, shrubs, and trees. All plant material shall be selected from the Arizona Department of Water Resources (ADWR) approved list of low water use plants for use within the public right-of-way. Although allowed by the ADWR approved list, not all plant materials are appropriate for use within the public right-of-way.

The use of Palm trees is prohibited within City of Chandler maintained right-of-way medians, unless approved for use under a special design district and maintenance agreement.

2. Inert Ground Covers

Inert ground covers are defined as rock ground covers and decorative pavements. Rock ground covers include: decomposed or crushed granite, gravel, stone, and boulders. Boulders, stone or rock aggregate with a dimension greater than an 8" diameter shall not be used within median landscape areas. Decorative pavements include: interlocking paving units or patterned/textured concrete. Decorative pavements may have defined applications within right-of-way streetscape or may be used to accent or enhance streetscape features within or adjacent to the right-of-way.

3. Turf Grasses/Lawn

In accordance with the Arizona Department of Water Resources (ADWR), new turf area introductions are not allowed within the public right-of-way. Whenever possible, existing turf areas shall be replaced with low water requirement plantings and/or inert ground cover materials.

E. PLANT DENSITY REQUIREMENTS

1. Tree Density for Medians

Trees shall not be planted within median landscape areas that measure less than eight (8') feet in width, from back of curb to back of curb.

In general, the required tree density formula for median landscape areas shall be as follows:

- a. The minimum required tree density for all median landscape areas greater than eight (8') feet wide and less than fifteen (15') feet wide shall be determined at a ratio of one (1) per thirty(30') feet of plantable median length. Medians greater than fifteen (15') feet in width will require increased tree densities and evaluated on a case by case basis per the City of Chandler Public Works Department Landscape Architect.
- b. In addition to the minimum required tree density of one (1) tree per thirty (30') feet of plantable median length, an additional one-third (1/3) of the required minimum total shall be added within the portion(s) of the median landscape area outside the vehicular sight distance/visibility clear zone.
- c. The desired location for increased median tree densities is within the permanent and/or temporary portion(s) of phased median landscape areas, outside vehicular sight distance/visibility clear zones.
- d. If all permanent and/or temporary portion(s) of phased median landscape areas are within vehicular sight distance/visibility clear zone or the additional one-third (1/3) of the total trees will not fit within the median landscape area(s) outside the vehicular sight distance/visibility clear zone, the designer must indicate on the plan(s) any discrepancies, per median section, at the time of the first City of Chandler review submittal.

- e. At the time of the first submittal review, the City of Chandler may exercise the option to modify the tree density requirements, which may result in the addition or deletion of trees.

F. TREE DENSITY FOR RIGHT-OF-WAY FRONTAGES

In general, the required tree density formula for face of curb/right-of-way frontage landscape areas shall be as follows:

1. The required minimum density of trees of face of curb/right-of-way frontage landscape areas up to twenty (20') feet wide, shall be determined at ratio of one (1) per thirty (30') linear feet of right-of-way frontage length. Face of curb/right-of-way frontages greater than twenty (20') feet in width will require increased tree densities and evaluated on a case by case basis per the City of Chandler Public Works Department Plan Review.
2. The required formula for increasing tree densities within face of curb/right-of-way frontage landscape areas greater than twenty (20') feet wide, shall be one (1) tree per 800 square feet.

Trees within median and right-of-way frontages may be uniformly spaced or planted in random groupings within the median or right-of-way frontage, as long as the density ratio criteria indicated above is correct for the full length of the median or right-of-way/frontage improvements and as long as the maximum spacing between trees does not exceed 100'. The minimum spacing for trees shall not be less than one-half of the mature canopy spread of each of the two adjoining trees. Actual plant placement and planting patterns shall be determined by the designer and submitted to the City of Chandler for review and approval.

G. GROUND COVER AND SHRUB DENSITY FOR MEDIAN AND RIGHT-OF-WAY FRONTAGES

Ground cover plants and shrubs at maturity shall provide 50% minimum coverage of the total available landscape surface area for permanent median and right-of-way frontage areas.

Ground cover plants and shrubs at maturity shall provide 50% minimum coverage of the total available landscape surface area for temporary median and right-of-way frontage areas.

H. PLANT SPECIES VARIATIONS

There shall be a minimum of two and a maximum of five different tree species/varieties and a minimum of three and a maximum of twelve different shrub/ground cover species/varieties required per design area.

Other plan specie variations may be allowed pending review and approval of the City of Chandler Public Works Department Landscape Architect

2. DESIGN GUIDELINES

A. ENGINEERING/TRANSPORTATION DESIGN STANDARDS

All engineering and roadway design shall be in accordance with the most current edition of the Maricopa Association of Governments (M.A.G.) “Uniform Standard Specifications for Public Works Construction” and “Uniform Standard Details for Public Works Construction” or as modified by the most current edition of the City of Chandler Standard Specifications & Details.

B. UTILITIES

Utilities (underground or above ground) shall be located in accordance with the above referenced City of Chandler Standard Specifications and Details. However, all new utility installations or modifications to existing utility locations should be assessed and reviewed with the City of Chandler Public Works Department to determine if adjustments to the above standards may provide more appropriate placement of utilities that may otherwise restrict, prohibit, or be in conflict with desired landscape improvements. Utilities should not be located directly in the center of medians which are less than 16 feet in width. Utilities, if required within median areas, should be offset to avoid conflicts with tree planting pit excavations and root growth. Early identification and coordination of engineering and landscape design requirements will provide a greater opportunity to initiate modifications and adjustments to allow both to be successfully integrated into the design.

Irrigation system water main connections, meters, and backflow prevention units for the median landscape shall be located within the landscape median. Center each unit equal distance between the curbs with a minimum setback of six (6) feet from the face of the curb.

Irrigation system power sources shall be un-metered as approved by the City of Chandler and utility company having jurisdiction. Irrigation controllers and enclosures for the median landscape shall be located within the landscape median whenever possible. Center each unit equal distance between the curbs with a minimum setback of six (6') feet from the face of the curb.

If backflow prevention units and irrigation controllers cannot be located within the median landscape areas, each unit shall be located as far back of curb and walkway as possible while remaining within the right-of-way limits as approved by the City of Chandler Public Works Department.

Minimum setback distance for above ground irrigation installations from any walkway or curb edge shall be two (2') feet.

The location and position of irrigation system backflow prevention units, controllers, meter pedestals, and related enclosures shall not conflict with vehicular sight visibility.

The right-of-way landscape design shall take into consideration any potential conflicts between proposed landscape items and existing or planned utility installations. Landscape plants and irrigation system components shall be selected and located to maintain all required access, clearances and setbacks adjacent to utility installations. This shall be coordinated by the designer and verified by the developer and/or contractor with the utility companies prior to any installation.

No trees should be installed adjacent to or beneath overhead utility lines if the mature growth habit of the plant will conflict with the overhead lines or restrict utility service access (Refer to Appendix "A").

C. STREET LIGHTING

Coordinate landscaping to avoid conflicts with street and pedestrian light poles, wiring, conduit and illumination patterns.

Medians less than sixteen (16') feet wide will not allow enough tree placement offset distance to prevent conflicts between the required centerline location of street light conduit/cable and required tree installation and setback requirements. In this situation, it is recommended that the designer obtain approval to offset the street light conduit/cable as necessary to provide adequate distance to allow required tree installations.

Decorative and accent lighting shall not be designed or installed within the right-of-way without approval from the City of Chandler Public Works Department.

D. GRADING AND DRAINAGE

Aesthetic grading and land form design (mounding and depressions) of right-of-way areas and medians will be used to provide visual relief, control surface drainage, maintain scale of the adjacent walls and to visually reduce the appearance of long continuous runs of straight wall. Offset or meandering wall alignments in combination with contoured land form design is also recommended.

Aesthetic grading or land form surface variations greater than six (6") inches within right-of-way and median landscape areas less than eight (8') feet in width is not recommended. For areas eight (8') feet or greater in width, aesthetic grading and land form design is required. Cut or

depressed slopes and fill or elevated slopes shall be constructed in accordance with the engineering grading and drainage plans. Slopes should be no steeper than 4:1 (H:V). Fill areas should be compacted between 85% and 90% in eight (8") inch maximum depth lifts.

Upon completion of site grading, underground utilities and landscape irrigation system installations, the entire site shall be fine graded by dragging and raking to remove all clods and rocks one (1) inch and larger. All landscape area soil shall be water settled and compacted to required densities. Prior to any planting, an inspection shall be requested and completed by an authorized City of Chandler representative. All grades shall be kept within a tolerance of one-tenth (1/10") foot, plus or minus in landscape areas. Where installation of topsoil is specified or shown on the drawings, topsoil shall be installed at a minimum depth of eighteen (18") inches (Refer to Detail No. 24 of this guideline manual.)

Designers should attempt to balance earthwork requirements between cut and fill whenever possible to avoid importing and exporting requirements.

All imported soil shall be thoroughly tested and approved by a State of Arizona certified soils testing laboratory to meet the requirements for topsoil and be free of any toxic substances.

E. SAFETY CONSIDERATIONS

Safety must be an integral part of all public right-of-way design, including streetscape improvements. Streetscape design must consider the safety of all right-of-way users from vehicular and pedestrian to bicycle and maintenance personnel. Because many of the landscape elements that make up the streetscape are not constant, the designer must be aware of how the various elements will change and how these changes will affect the relationship between the streetscape elements and the users.

F. VEHICULAR/PEDESTRIAN SIGHT DISTANCE, VISIBILITY CLEAR ZONES

The following referenced detail and sight distance regulations are with regard to vehicular visibility and safety. The sight distance standards provided herein may not be applicable to every intersection or vehicular sight distance condition. Each vehicular sight distance must be evaluated on an individual basis due to the multiple site specific conditions and roadway geometric factors that may vary at any location. The information contained herein is based on 90 degree intersections, flat (vertical alignment) and straight (horizontal alignment) roadway conditions. Variations in design speeds and posted speed limits, roadway elevation changes, alignment skews and curves or various other conditions are but a few of the factors that may significantly alter required sight distance criteria and visibility clear zones.

Sight distance criteria and visibility clear zones shall pertain to all classifications of roadway intersections and commercial/shopping center driveways with access onto any public roadway.

Refer to: City of Chandler Standard Sight Distance Detail No. C-246

All trees within vehicular sight distance/visibility clear zones shall have a vertical canopy clearance/clear trunk to six (6') feet above the nearest vehicular pavement curb. Trees with growth characteristics such as low branching or multiple trunks may require larger size specimens to be installed to provide the required canopy clearance or increased tree spacing distances will be necessary to insure adequate sight visibility is provided and maintained. Trees within vehicular sight distance visibility clear zones shall be horizontally spaced and/or offset to prevent creation of a "picket fence effect" based on the angle and position of the viewer from the origin point of the vehicular sight distance. Minimum or maximum tree spacing requirements previously indicated may require modifications as a result of actual roadway and sight distance/visibility clear zone conditions or tree size and growth characteristics.

Visibility obstruction by all other landscape elements, other than trees, within vehicular sight distance clear zones shall not exceed two (2') feet in height. In other words, no single or combination of shrubs and ground cover plant material, inert ground cover materials or elevated land form, within vehicular sight distance visibility clear zones, shall exceed two (2') feet in height above the nearest vehicular pavement curb (when fully matured).

The above limits of sight distance visibility obstruction, must provide a minimum four (4') foot vertical visibility window between the two (2') foot maximum visibility obstruction height and below the six (6') foot minimum canopy clearance/obstruction height.

As a rule of thumb, the sight distance visibility of any on road vehicle, within the four (4') foot vertical visibility window, may not be obstructed more than 25% at any time. In other words, within the four (4') foot vertical visibility window, 75% of any moving vehicle profile must be visible at all times from the origin point of any sight distance position or potential conflicting intersection turning movement.

Irrigation equipment installations are required to be sized and located to avoid conflicting with sight distance visibility clear zones. Irrigation equipment or equipment enclosure installations, shall not exceed two (2') foot maximum height above the nearest vehicular pavement curb unless located outside the sight visibility clear zone.

G. LANDSCAPE SETBACKS/CLEARANCES

Plant material setbacks as indicated below shall be adhered to for the safety of the public, maintenance personnel and maintenance operations.

All the trunks within median landscape areas shall maintain a minimum six (6') foot horizontal setback from the face of any curb or four (4') feet horizontal setback towards the centerline from the face of future curbs in extra wide medians. In the areas effected by the turn lanes, trees should be six (6') feet from the face of the permanent or temporary curb if possible but in no case less than four (4') feet from the face of any curb.

There shall be no tree within fifty (50') feet from the end of any median.

Within public right-of-ways, the use of plant materials that have thorns, rigid pointed blades or needles are not recommended. Use of plants with sharp protrusions shall be restricted to areas where the mature natural growth pattern of the plant (horizontal spread and/or vertical canopy clearance) will remain a minimum of three (3') feet from any pedestrian surface or bicycle lane.

All plant material shall be located to prevent encroachment of normal growth patterns into pedestrian or vehicular circulation areas and sight distance clear zones.

All shrub and ground cover plantings shall maintain a minimum one (1') foot setback from walkways and curbs at maturity. All median shrubs and ground cover plantings shall maintain a minimum two (2') feet setback from curbs at maturity.

Trees shall be selected and located to provide adequate vertical canopy clearance above pedestrian or vehicular circulation areas as follows: eight (8') feet minimum above pedestrian walkways and thirteen feet (13'-6") six inches minimum above vehicular traffic routes.

All trees must be located so the center line of the tree trunk is a minimum six (6') feet behind the face of the curb and a minimum two (2') feet from walls or fences installed along the property line/right-of-way (for all frontage landscape areas of sufficient size to allow tree installations).

All planting of trees, shrubs and ground cover shall comply with the requirements of Section B in this guideline manual. All plant material used in right-of-way and median landscaping must be approved by the City of Chandler Public Works Department. Some materials appearing on the approved plant list (Refer to Appendix "A") are not considered acceptable for use within right-of-way areas.

The location and position of any plant materials shall not obstruct visibility of or restrict maintenance access to any signage or traffic control devices.

All plant materials shall be selected and arranged to meet the above setback and clear zone requirements without maintenance. Some tree species may require occasional pruning to encourage strong growth and maintain the required sight distance clear zones and setbacks.

H. PHASED ROADWAY/TEMPORARY MEDIANS

Phased major arterial roadways in the City of Chandler will typically have an initial median with twenty-four (24') feet of additional width (Refer to Standard Detail No. C-204). The additional width is considered to be the requirement for the expansion of two future twelve (12') foot lanes, one on each side of the permanent landscape median area. To avoid having the future lane areas or temporary portion of the median appear unattractive and void of landscaping, the City of Chandler desires to have temporary landscaping installed during the initial phase of the roadway development for the unknown interim period.

Because the landscape improvements for this area are considered temporary, the designer must consider the potential impacts associated with the future lane additions, from both a construction and cost conscious standpoint. The design and installation of both the planting and irrigation system must be sensitive to the permanent portion of the median as well as the temporary portion. The designer must provide an overall median design that will allow for the future removal of the outer edges while maintaining a complete and total design for the permanent portion of the median to remain. Both the planting and irrigation systems must be designed to allow for the removal of the temporary portion with little or no impact on the permanent portion. Major components of the irrigation system should not be installed in temporary median areas. The location and installation of both the temporary and permanent median landscape elements must also be designed to be in accordance with sight distance and clear zone setback requirements for both the interim and future roadway conditions.

I. MAINTENANCE

With the exception of natural desert areas or areas restricted from public access, there are no maintenance free landscapes within public right-of-ways.

Minimizing maintenance shall be a primary consideration in the selection, location, and installation of all landscape planting and irrigation materials and equipment.

Plant material selection and layout must consider the mature growth potential and natural growth habit of each plant specie.

Careful consideration must be given to the selection and placement of all plant materials with regards to frost/heat sensitivity, solar or shade exposure, and susceptibility to pests and diseases.

It is strongly recommended that the designer utilize a multiple plant specie palette and multiple plant massing combinations to increase visual diversity, enhance seasonal interest and avoid potential large scale plant losses. Designers should avoid over-use of a particular plant specie due to the potential for single specie die-out or maintenance problems resulting from horticultural conditions, climate hardiness or diseases impacting a monoculture plant type.

3. PLANT MATERIALS

A. DESIGN CONSIDERATIONS

Landscaping of public right-of-way areas is important to the overall image, character and visual quality of the primary circulation corridors throughout the City of Chandler. The landscape design should attempt to provide year round aesthetic appeal and interest; improve space and scale relationship of the roadway for the users; accent or improve awareness of community features; provide visual screening and noise buffering; micro-climate enhancement and provide a model for conservation and sensitivity to our natural environment, water consumption and minimizing maintenance requirements.

The design of right-of-way landscaping that is adjacent to an existing or previously approved development plan, must be compatible with the existing landscaping plan. If the designer (per City approval) or City of Chandler do not desire to continue a design that is compatible with the adjacent landscape plan, the new design shall provide a transitional zone to change from the existing landscape character to the new.

Community or commercial development gateways and entry features are important to the image and awareness of the particular development and should be considered an integral part of the overall design of the streetscape. Right-of-way designs should be coordinated to insure a compatibility and unified appearance between gateway/entry features and the streetscape.

All right-of-way landscape and irrigation system installations shall be located entirely within the limits of the right-of-way. There shall be no overlap between public and privately maintained systems without prior approval and written authorization from the City of Chandler Public Works Department. Where publicly maintained and privately maintained

landscape areas abut each other, a method of separation shall be provided to establish clear limits of maintenance responsibility. Acceptable methods for providing separation between public and private landscape areas shall be as follows: walls, fences, walkways or concrete/metal headers (plastic or wood headers shall not be allowed).

B. PLANT MATERIAL SELECTION AND INSTALLATION

Plant material size, type and related standards shall be in accordance with Section B, item 15 and appropriate details of this guideline manual.

Trees to be installed within sight distance/visibility clear zones shall be selected and sized to provide required vertical clearances in accordance with Section C, 2.5, at time of installation.

C. PLANT MATERIAL MAINTENANCE PERIOD

The same maintenance period shall comply with Section B, item 18 in this guideline manual.

4. INERT MATERIALS

A. ROCK GROUND COVER

Rock ground covers are considered to be any boulder, rock, stone, or aggregate material used to mulch or cover landscape area soil surfaces. Decomposed or crushed granite is the recommended rock ground cover material for use within City of Chandler right-of-way landscape areas. Rock ground covers shall provide a minimum of two (2) inch thick uniform depth after settlement. Color, gradation, aggregate size and required installation depth of rock ground cover material shall be approved by the City of Chandler Public Works Department Landscape Architect Recommended color range is gold or tan. Other color selections will require prior approval and will be reviewed on a case by case basis.

B. INSTALLATION/MAINTENANCE

All rock ground cover areas shall be sprayed with pre-emergent herbicide, by a licensed applicator, as part of installation as follows (a minimum of three applications are required):

1st - Prior to the application of the rock ground cover - one-half (1/2) gallon per acre.

2nd - After rock ground cover has been applied - one-half (1/2) gallon per acre.

3rd - Prior to final acceptance - one (1) gallon per acre.

The City shall be furnished, for approval, written documentation of applicators license, all materials and application rates and the scheduled dates for application prior to the start of any applications.

C. DECORATIVE PAVEMENT

In median landscape design, the Design Engineer shall follow the dimensions and layout as shown (Refer to Standard Detail No. C-225). This requirement is mandatory at all median left turn bay locations; at all other median breaks to enhance non-planted areas and facilitate adequate visibility for motorized vehicles and to provide enhancement of median areas that are too narrow for planting and too narrow for safe access by maintenance personnel.

Decorative pavement shall be used in all median areas measuring less than six (6) feet in width from face of curb to face of curb.

Refer to City of Chandler Standard Specifications and Details Detail No. C-237 and Detail No. C-225.

5. IRRIGATION SYSTEMS

A. IRRIGATION AND DESIGN CONSIDERATIONS

All irrigation equipment and installations shall be in accordance with types, materials and standard details approved by the City of Chandler.

B. IRRIGATION SYSTEM LAYOUT AND LOCATION

All right-of-way irrigation system components installations providing water to right-of-way landscape plants shall be located entirely within the limits of the right-of-way. There shall be no overlap between public and privately maintained systems without prior approval and written authorization from the City of Chandler Public Works Department.

All irrigation system mainlines, valves, wire and other primary system components or equipment shall be located within the right-of-way median landscape area or as close as possible to the outer edge of the right-of-way.

All landscape irrigation systems shall be designed so that irrigation to trees, shrubs and ground cover varieties will be operated by separate valves.

C. IRRIGATION SYSTEM TYPE/MATERIALS/EQUIPMENT

The City shall review and approve the irrigation system and materials prior to installation. All irrigation shall comply with the requirement of

Section B, items 19 through 42 in this guideline manual with the following inclusions:

All controllers shall be equipped with a plug-type harness for a remote control attachment. Wiring shall correspond to the geographic location of the valve and station controlled. The coordination of wiring systems shall be approved by the City, prior to the final acceptance.

For right-of-way and median irrigation systems only rigid type P.V.C. or schedule 80 flex hose riser materials shall be used, with bubbler, drip or spray type heads. Use of poly pipe is prohibited. Poly or vinyl emitter ("spaghetti") tubing in conjunction with multi-outlet emitters is prohibited. Poly tubing shall have limited use in the initial and temporary distribution of water at tree installations and shall be used only in conjunction with single-outlet emitters. All horizontal installations of poly tubing must be installed and anchored a minimum of four (4) inches below the finished landscape area surface.

All irrigation heads (emitters, bubblers, sprays) must be rigid "hard" plastic, one half (1/2) inch diameter threaded/screw on type installation unless otherwise approved by the City of Chandler Public Works Department.

D. IRRIGATION SYSTEM MAINTENANCE

The same maintenance period shall comply with Section B, item 42 in this guideline manual.

6. SOIL TESTING

All areas in which planting is to be done shall have soil analyses performed to determine the soil deficiency and the nutrients needed to sustain and insure healthy plant growth. Any landscape areas suspected of having been exposed to or treated with soil sterilants or materials detrimental to plant health shall be tested for the presence of toxic substances. If found, all toxic substances shall be removed prior to the start of any landscape planting or irrigation system installations.

All soil testing shall be completed and approved by a State of Arizona certified soils testing laboratory to meet the requirements for topsoil or fill and be free of any toxic substances. The City of Chandler Public Works Department shall receive a copy of all tests prior to final acceptance.

7. FENCES/WALLS OR OTHER STRUCTURES

Unless approved by the City of Chandler Public Works Department, walls, fences or other screening or decorative type structures will not be installed within the limits of right-of-way.

Fences/walls, as required by Planning and Zoning, adjacent to the right-of-way, shall be installed in some form of a staggered, offset or meandering alignment.

8. SPECIAL RIGHT-OF-WAY CONDITIONS

A. FACILITIES FOR THE PHYSICALLY CHALLENGED

All right-of-way improvements shall be in accordance with the current Federal regulations and requirements of the Americans with Disabilities Act.

Coordinate all streetscape and landscape design to prevent conflicts or restrict routes and facilities providing access for the physically challenged.

B. TRANSIT FACILITIES

Refer to the Regional Public Transportation Authority (RPTA) handbook and guidelines for landscaping transit facilities.

SPECIFICATIONS FOR RIGHT-OF-WAYS AND MEDIANS

SECTION D:

1. GENERAL

When the Engineer is designing a right-of-way landscaping system that is adjacent to an existing or previously approved plan, the proposed plan must be compatible with the existing landscaping plan. If the Engineer does not desire to continue the existing plan or the City does not desire it to be continued, the Engineer shall design a transitional area to change from the existing to the new type of landscaping.

The Engineer, in designing the right-of-way landscaping, shall take into consideration any potential conflict between the trees the Designer proposes and existing or planned overhead utility lines. This shall be coordinated by the Developer or Contractor with the utility companies.

2. FINISH GRADES

Upon completion of grading, underground utilities and sprinkler system, the entire site shall be fine graded by dragging and raking, removing all clods and rocks one (1) inch and larger. All soil shall be water settled. Prior to any planting, an inspection shall be requested. The top six (6) inches shall be topsoil for all areas designated to receive plantings that will require topsoil. Before decomposed granite is installed, area will be treated with a pre-emergent chemical.

3. SOIL TESTING

All areas in which planting is to be done shall have soil analyses performed to determine the soil deficiency and the nutrients needed to sustain and insure healthy plant growth. Soil analyses shall be submitted to the City of Chandler, Street Division.

4. IRRIGATION SYSTEM

All mainlines, valves, and wire shall be located as close as possible to the back of the right-of-way. Irrigation within medians shall be located at the center line.

The City shall review and approve the irrigation system prior to installation. All irrigation shall comply with the requirement of Section B, items 19 through 40 in this procedure manual with the following inclusions:

- A. All controllers shall be equipped with a plug-type harness for a remote control attachment. Wiring shall correspond to the geographic location of the valve and station controlled. The coordination of wiring systems shall be approved by the City, prior to final acceptance.

- B. For right-of-way and median irrigation systems only rigid type P.V.C materials shall be used, with bubbler or drip emitter heads. Hard pipe to riser-maximum length of drip tubing is six feet (6').

5. PLANTING OF TREES, SHRUBS, AND GROUND COVER

All trees must be located so the center line of the tree trunk is at least eight (8) feet behind the back of the curb, at least five (5) feet from the nearest edge of sidewalk and at least two (2) feet from the fence installed along the property line (for all right-of-way areas of sufficient size to allow trees). There shall be a minimum of one (1) tree per forty (40) linear feet of right-of-way area. A minimum of two (2) different varieties and a maximum of five (5) different varieties will be required.

All planting of trees, shrubs, and ground cover shall comply with the requirements of Section B in this procedure manual. All plant material used in right-of-way and median landscaping must be approved by the Director of Public Works. Some materials appearing on the plant list (See Appendix A) will not be acceptable for the use in these areas.

6. TRANSPLANTING A TREE

- A. Prepare planting area three (3) to five (5) times the diameter of the root ball. Till this area to the depth of the root ball. (If you must amend the backfill, then increase size of area and amend entire area. If you must use fertilizer in backfill, then use no more than three (3) pounds per inch of trunk diameter of a low nitrogen, slow release fertilizer).
- B. Dig planting hole in center of area no deeper than root ball. Make sure root ball will rest on undisturbed, firm soil and that the top will be at or slightly above the soil surface. This is important to prevent the tree from sinking. (If ground has poor drainage -- a heavy clay -- then plant root ball 1-2 inches above the soil surface.
- C. Remove the tree from the container. Avoid lifting the tree by its trunk (better to sacrifice the container). Either disentangle and spread encircling roots or cut and remove them. Score the sides of the root ball to encourage lateral root growth.
- D. Place tree in hole and backfill with unamended soil. Do not tamp backfill with your feet.
- E. Remove nursery stakes. Stake tree only if necessary.
- F. If irrigating by hose, then form a well just outside the original ball root. Irrigate tree. Water will settle the soil without compaction.
- G. Apply 3-4 or six (6) inches of an organic mulch over the entire area prepared in Step 1. Keep mulch away from the tree trunk.

7. DESERT LANDSCAPING

Decomposed granite is highly recommended as an acceptable stone cover. The stone cover shall be a minimum of two (2) inches thick.

The granite areas shall be sprayed with pre-emergent herbicide as approved.

- A. Prior to the application of the granite - 1/2 gallon per acre.
- B. After granite has been applied - 1/2 gallon per acre.
- C. Prior to final acceptance - 1 gallon per acre.

The City shall be furnished with written documentation of the schedule of application dates.

8. MAINTENANCE PERIOD

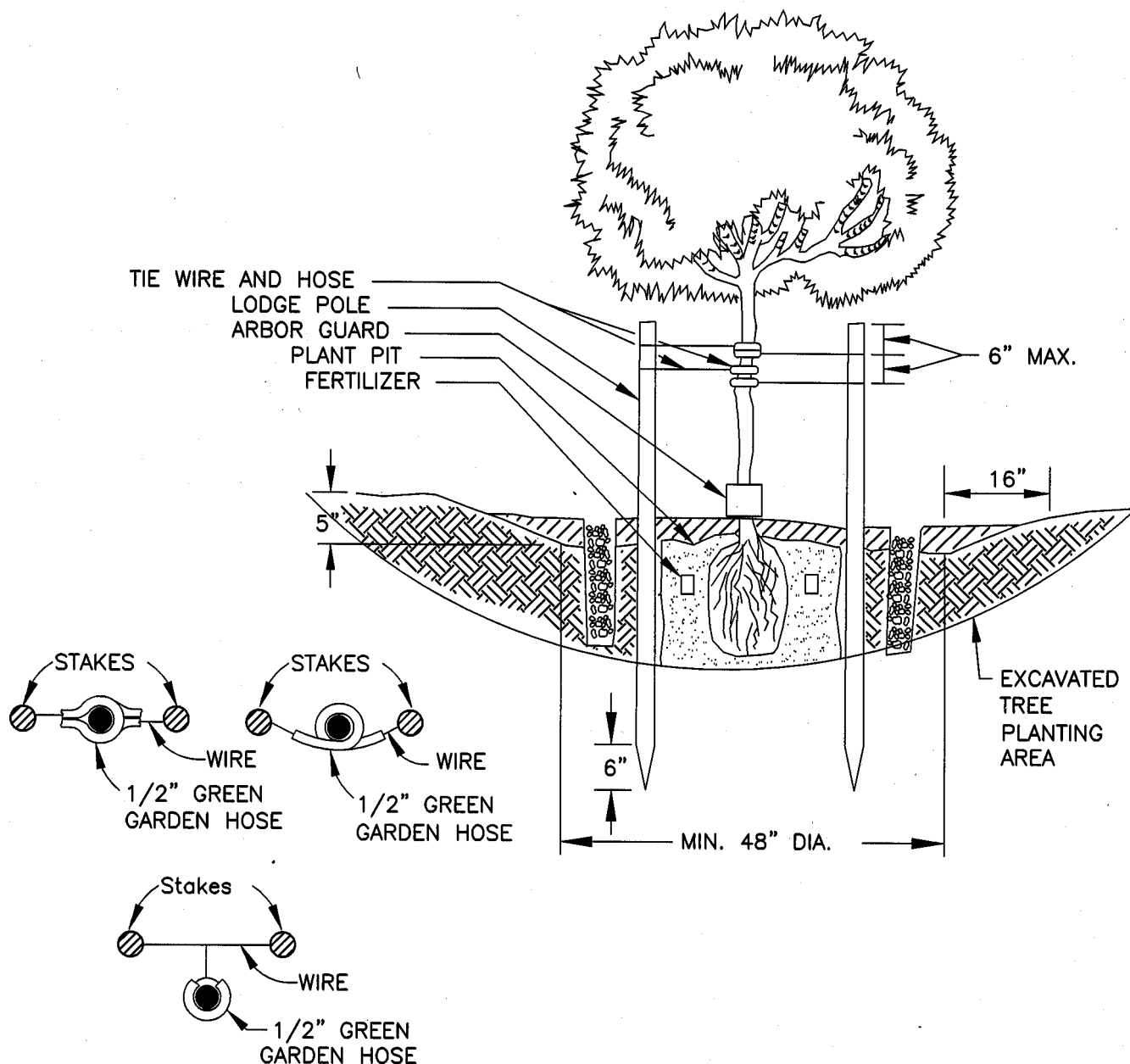
The same maintenance period shall comply with Section B, item 18 in this procedure manual.

9. FENCES

Fences, as required by Planning and Zoning along the property line, shall be installed in some form of a staggered alignment.

10. DECORATIVE CONCRETE

In median landscape design the Engineer shall follow the dimensions and layout as shown (Standard Detail #C-225). This requirement is mandatory at all left turn bay locations and at all other median breaks to facilitate adequate visibility for motorized vehicles. See the City of Chandler standard detail manual.



NOTES:

1. WIRE TO BE 12 GAUGE WEATHERPROOF WIRE.
2. TWO 8 FT. LODGE POLES SHALL BE USED FOR 15 GAL. TREES, EXCEPT FOR EUCALYPTUS WHICH SHALL USE TWO 10 FT. LODGE POLES.
3. NO MORE THAN THREE POUNDS OF FERTILIZER PER INCH OF TREE TRUNK DIAMETER.
4. MINIMUM PLANT PIT SHALL BE THREE TIMES THE WIDTH OF THE CONTAINER AND NO DEEPER THAN THE CONTAINER. SIDES TO BE SLOPED. BACKFILL WITH 3/4 NATIVE SOIL AND 1/4 SAND. TOP DRESS WITH 4" OF MULCH 6" FROM TRUNK. DO NOT PACK BACKFILL AROUND ROOT BALL.
5. SET ROOT BALL AT OR SLIGHTLY ABOVE SOIL SURFACE.
6. FORM IRRIGATION BORDERS JUST OUTSIDE ROOT BALL.
7. DO NOT PRUNE UNNECESSARILY.

City of Chandler



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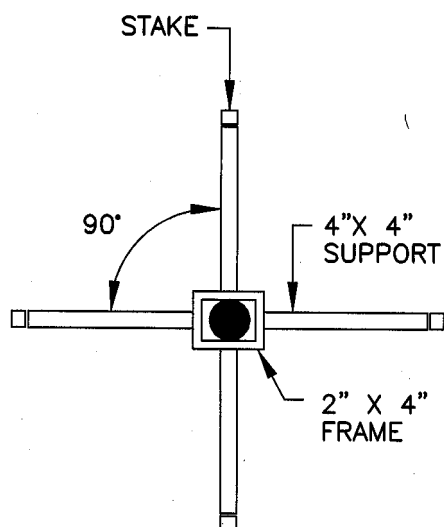
Guidelines for Landscaping and Irrigation

TREE PLANTING

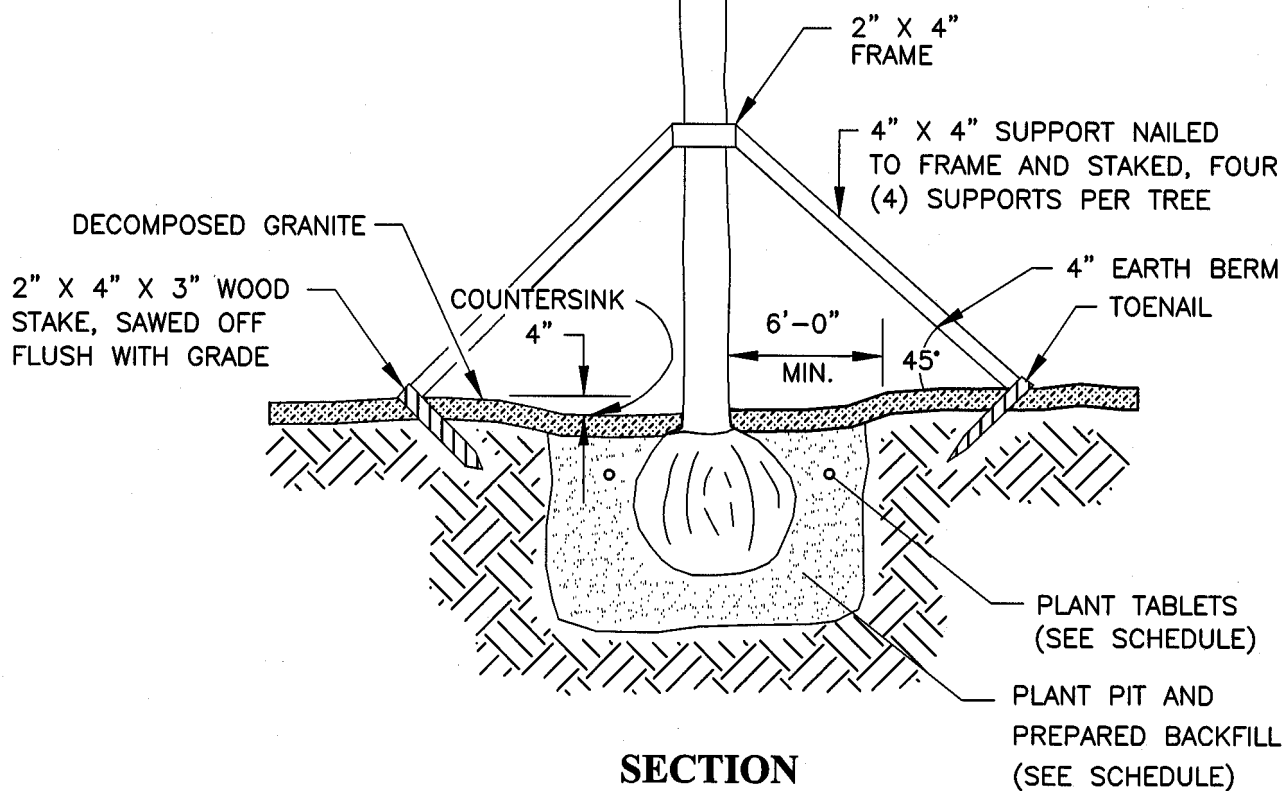
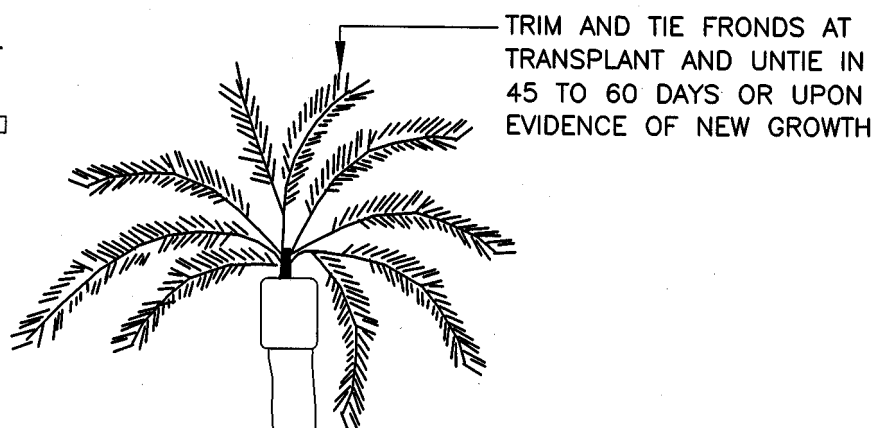
DETAIL. NO.

LS1

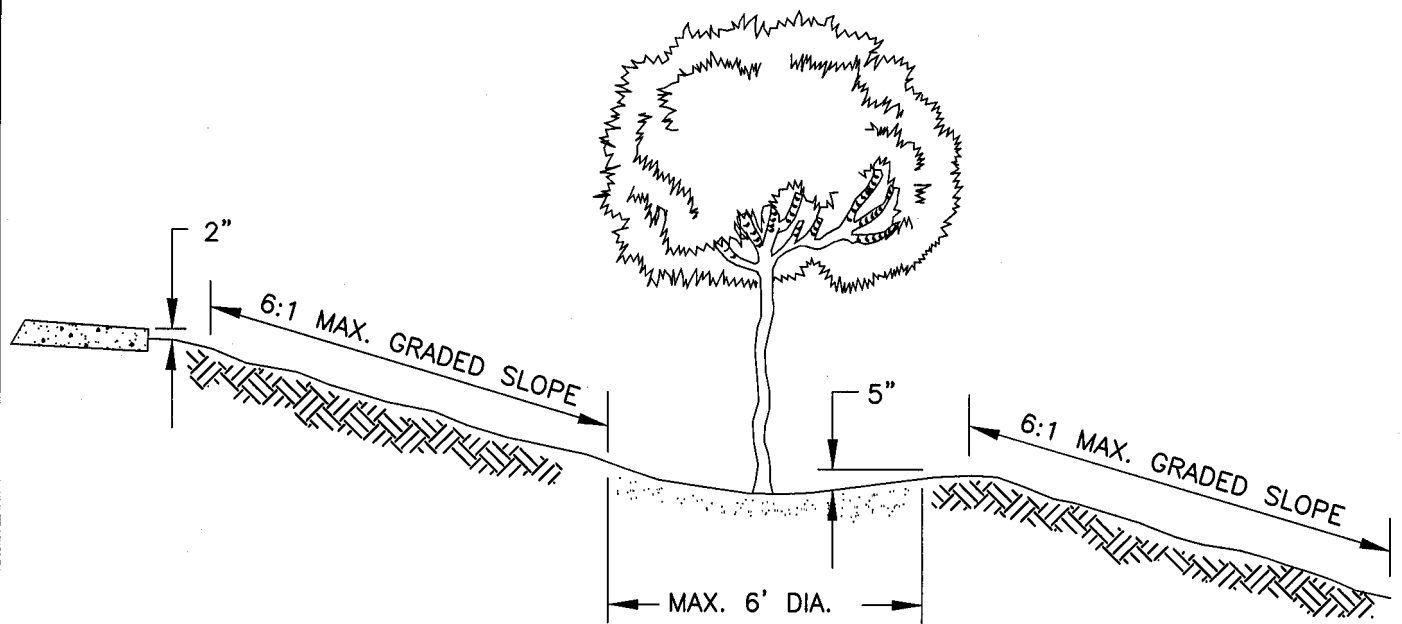
NTS



PLAN



SECTION



NOTES:

1. THE SLOPES SHALL BE CONTOURED IN SUCH A MANNER NOT TO EXCEED 6:1 GRADE; EXPECIALLY WHERE TREES ARE TO BE PLANTED.
2. IRRIGATION, STAKING AND PLANTING SHALL BE PER LANDSCAPING AND IRRIGATION DETAIL NUMBER LS1.

City of Chandler



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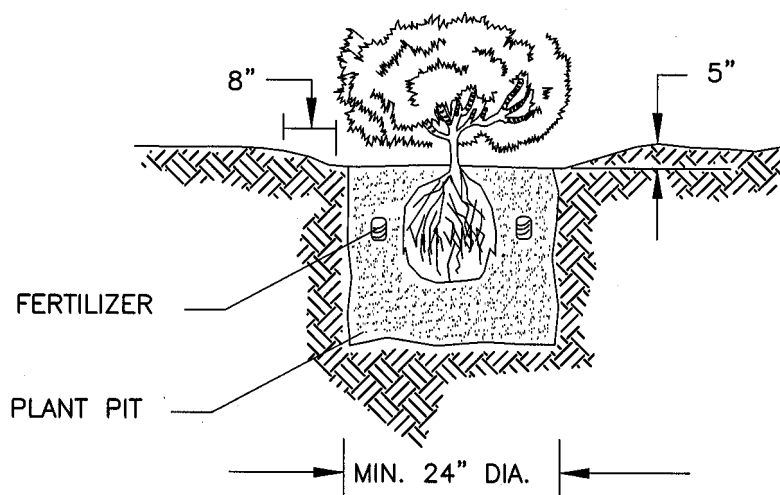
Guidelines for Landscaping and Irrigation

SLOPE TREE PLANTING

DETAIL. NO.

LS3

NTS



NOTES:

1. FERTILIZER TABLETS 21 GM. 20-10-15 (1) PER 1 GAL., (2) PER 5 GAL. MIX TABLETS WITH PLANTING MIX WHICH SHALL BE (1) PART EXISTING SOIL TO (1) PART MULCH.
2. MINIMUM PLANT PIT SHALL BE 2 TIMES THE DIAMETER OF THE CONTAINER AND 1-1/2 TIMES THE DEPTH.

City of Chandler



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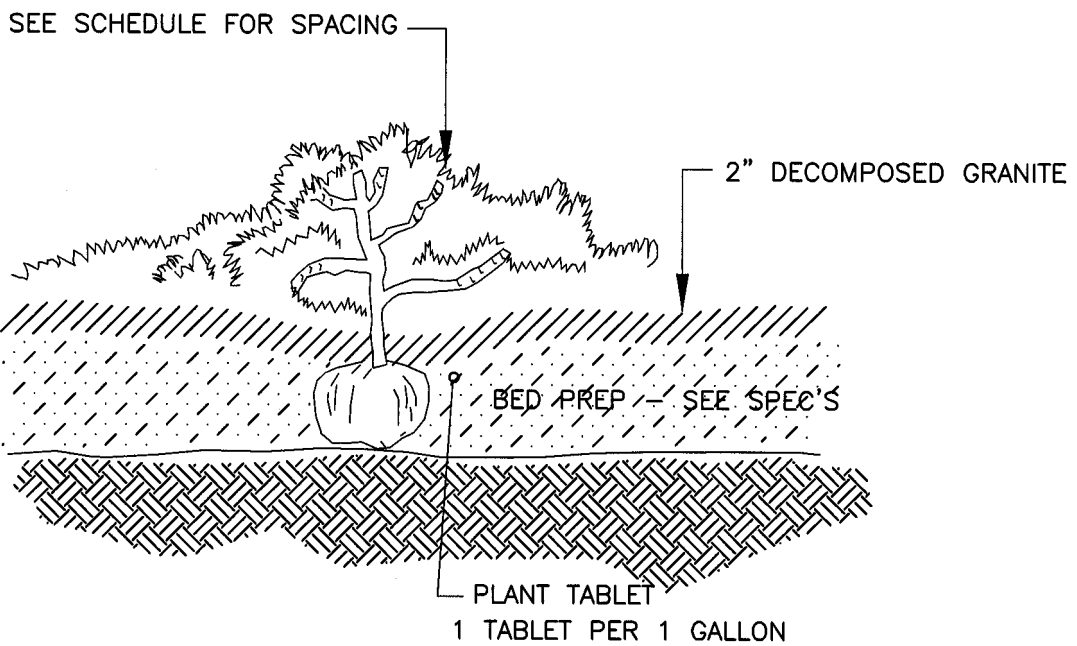
Guidelines for Landscaping and Irrigation

SHRUB PLANTING

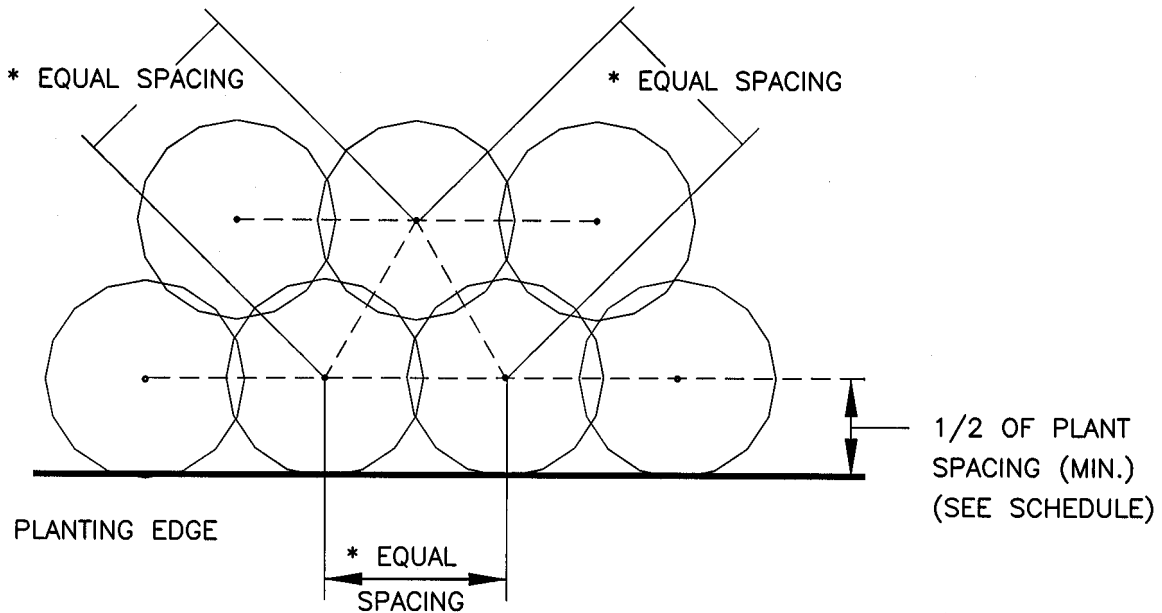
DETAIL. NO.

LS4

NTS



* SEE PLANT SCHEDULE FOR SPACING



City of Chandler



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Guidelines for Landscaping and Irrigation
SHRUB AND GROUND COVER SPACING

DETAIL. NO.

LS6

NTS

A - PLANTING PIT DIMENSIONS FOR TREES, SHRUBS

AND GROUNDCOVERS

<u>PLANT SIZE</u>	<u>WIDTH</u>	<u>DEPTH</u>
1 GALLON	1' - 0"	1' - 0"
5 GALLON	2' - 0"	1' - 6"
15 GALLON	2' - 6"	2' - 3"
24" BOX	4' - 0"	3' - 0"
30" BOX	5' - 0"	3' - 9"
36" BOX	6' - 0"	4' - 0"

B - PLANT PIT DIMENSIONS FOR PALMS

<u>TRUNK DIAMETER AT GRADE</u>	<u>MINIMUM DIAMETER PLANTING PIT</u>	<u>MINIMUM DEPTH PLANTING PIT</u>
12 - 24"	48"	42"
25 - 32"	56"	44"
33 - 36"	60"	48"

C - PLANT TABLET SCHEDULE FOR TREES, SHRUBS AND PALMS

1 GALLON	1 TABLET
5 GALLON	2 TABLETS
15 GALLON	4 TABLETS
24 BOX	6 TABLETS
36 BOX	6 TABLETS

D - BACKFILL MIX FOR TREES AND SHRUBS

3 PARTS EXCAVATED TOPSOIL
1 PART SAND
PLANT TABLETS PER SCHEDULE C



IRRIGATION LEGEND

QUANTITY	SYMBOL	MFG. AND DESCRIPTION

FRICTION LOSS

PRESSURE AT SOURCE _____ P.S.I.

PRESSURE VERIFIED WITH CITY _____ P.S.I.

FRICTION LOSS THROUGH: (TO FARTHEST HEAD)

WATER METER _____ P.S.I.

VACUUM BREAKER _____ P.S.I.

MAIN LINE PIPE _____ P.S.I.

VALVE _____ P.S.I.

LATERAL LINE PIPE _____ P.S.I.

TOTAL FRICTION LOSS _____ P.S.I.

REQUIRED PRESSURE AT HEAD _____ P.S.I.

(TOTAL FRICTION LOSS)+(REQUIRED P.S.I. AT HEAD) = PRESSURE REQUIRED AT SOURCE _____ P.S.I.

CALCULATIONS PERFORMED BY _____ SIGNED _____ DATE _____

City of Chandler



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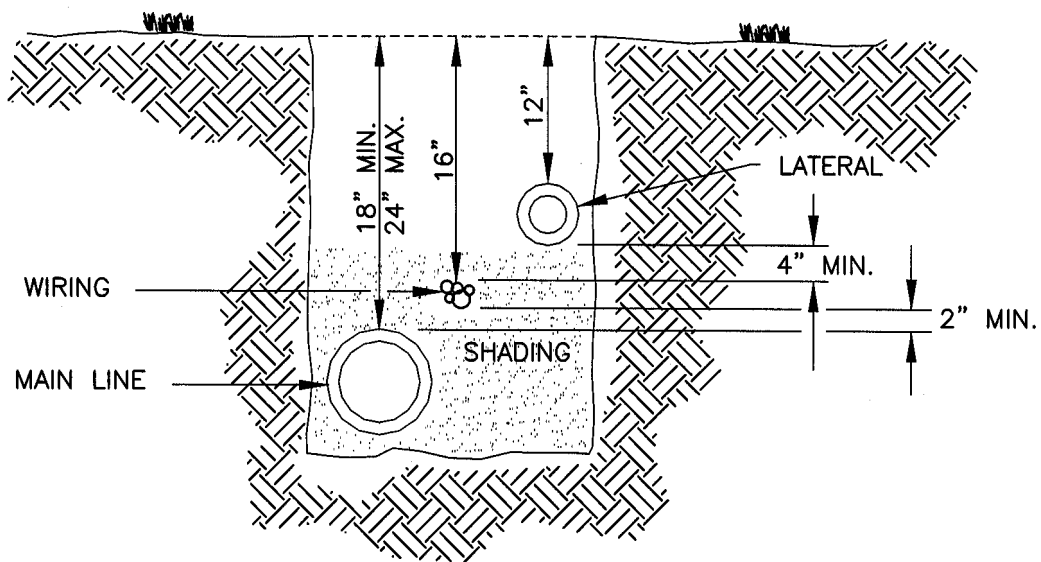
Guidelines for Landscaping and Irrigation

TYPICAL IRRIGATION LEGEND AND INFORMATION

DETAIL. NO.

LS8

NTS



NOTES:

1. TAPE AND BUNDLE WIRING AT 10 FEET INTERVALS.
2. SHADING SHALL BE DONE WITH EXISTING SOIL.

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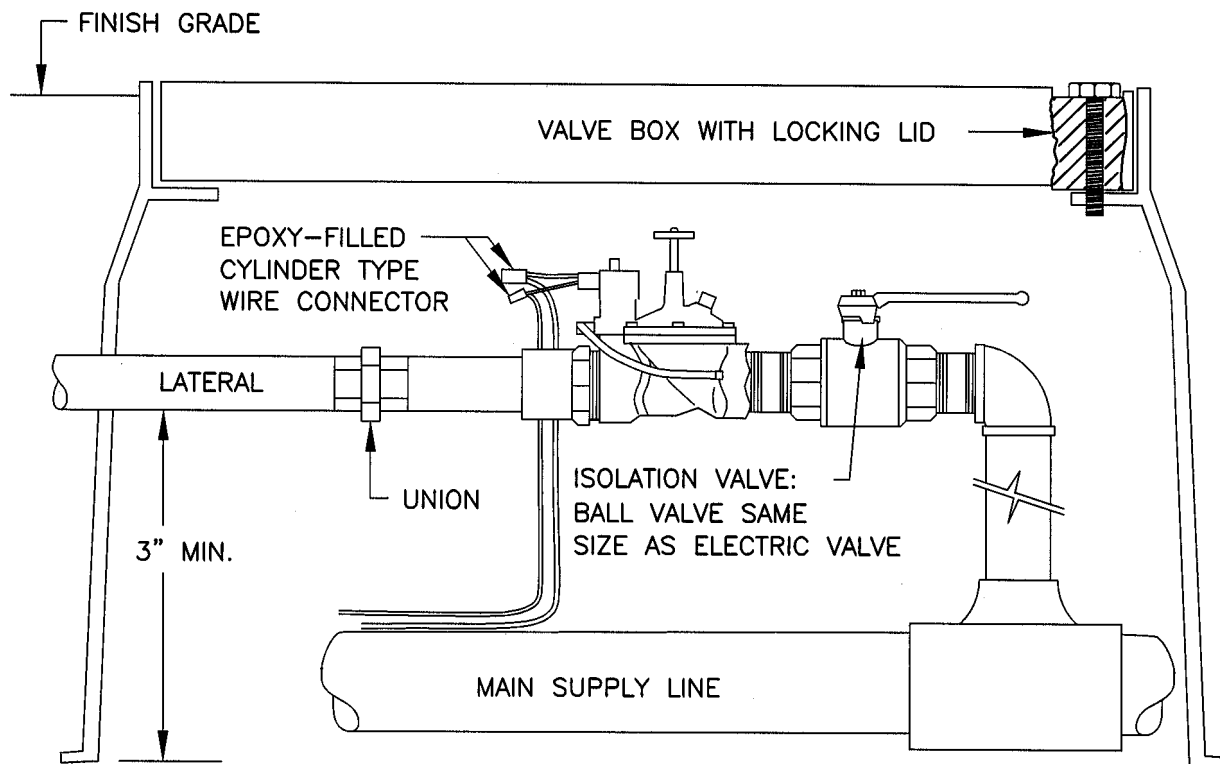
Guidelines for Landscaping and Irrigation

TRENCHING

DETAIL. NO.

LS9

NTS



NOTES:

1. PROVIDE EXPANSION COILS AT EACH WIRE CONNECTION.
2. QUICK COUPLERS SHALL BE IN SEPERATE VALVE BOXES.
3. PEA GRAVEL SHALL BE 4" TO 6" IN DEPTH UNDER VALVE BOX.
4. ALL PVC THREADED FITTINGS SHALL BE SCHEDULE 80.

City of Chandler



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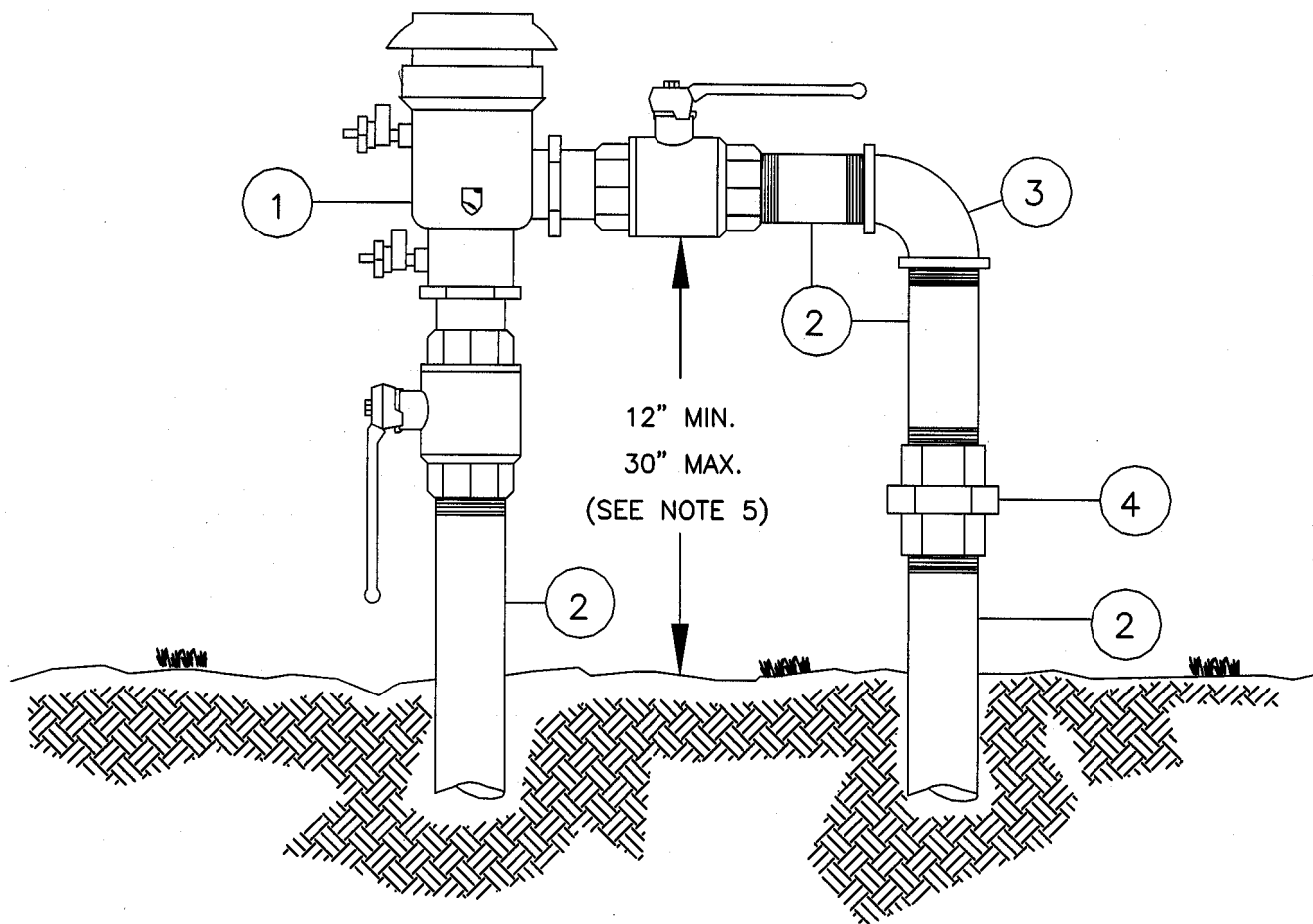
Guidelines for Landscaping and Irrigation

ELECTRIC REMOTE CONTROL VALVE

DETAIL. NO.

LS10

NTS



LEGEND

1. APPROVED PRESSURE VACUUM BREAKER ASSEMBLY (INCLUDES BALL VALVES).
2. TYPE "K" COPPER, 3/4" THROUGH 2" .
3. 90° ELL, TYPE "K" COPPER, 3/4" THROUGH 2".
4. COPPER UNION.

NOTES:

1. CONTACT THE CITY OF CHANDLER PUBLIC WORKS DEPT. FOR THE LATEST APPROVED LIST OF BACKFLOW PREVENTION ASSEMBLIES.
2. ASSEMBLY SHALL BE APPROVED BY THE U.S.C. FOUNDATION FOR CROSS-CONNECTION CONTROL AND HYDRAULIC RESEARCH.
3. TWO TEST COCKS SHALL BE INSTALLED AS PER U.S.C. WITH FLARE FITTING CAPS.
4. SHUT-OFF BALL VALVES MUST BE RESILIENT SEATED VALVES AS PER U.S.C.
5. ASSEMBLY MUST BE INSTALLED 12 INCHES ABOVE THE HIGHEST OUTLET ON THE SYSTEM. IF THIS DISTANCE EXCEEDS 30 INCHES A REDUCED PRESSURE BACKFLOW PREVENTION ASSEMBLY, G-049, MUST BE USED.

City of Chandler



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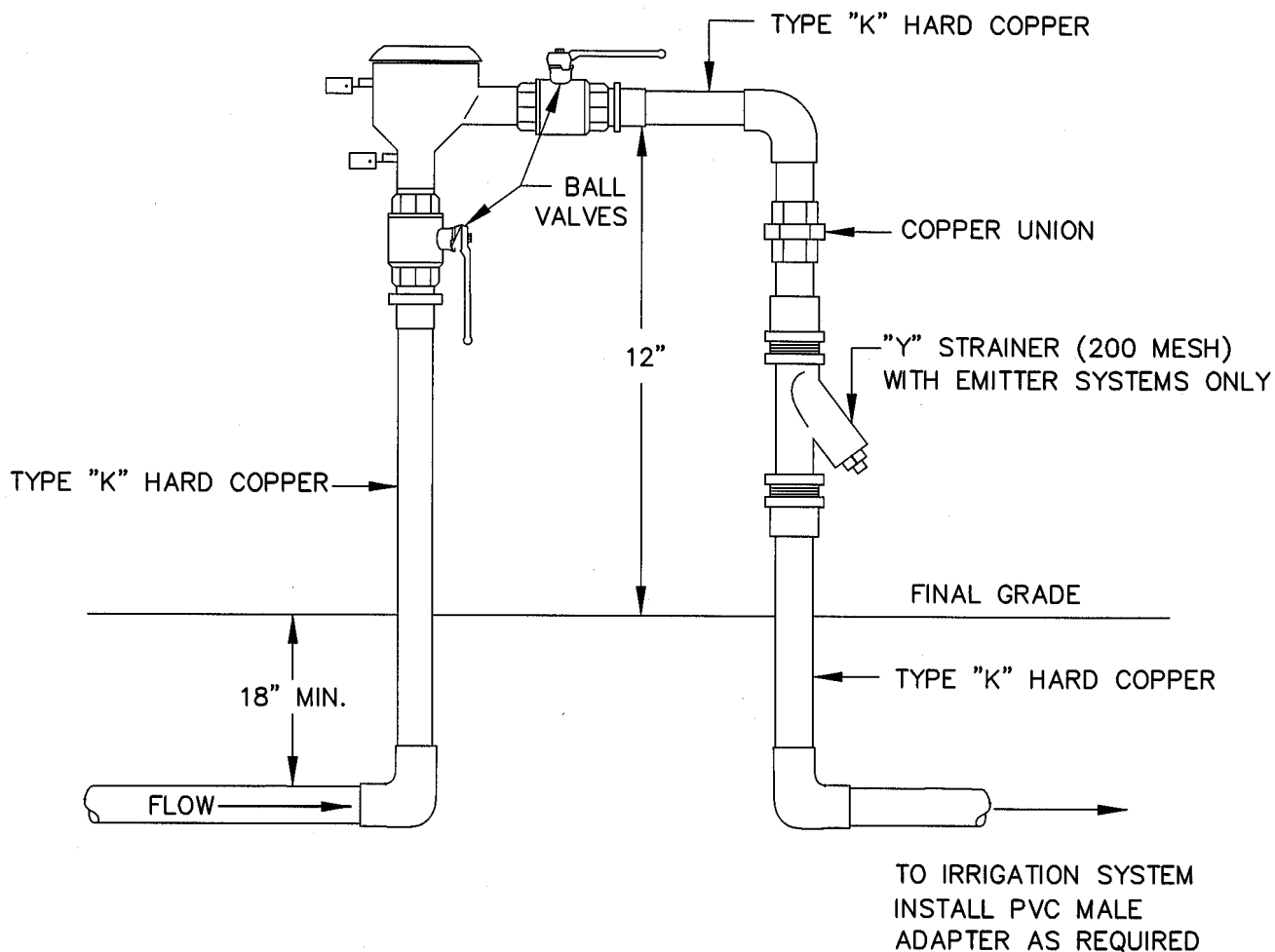
Guidelines for Landscaping and Irrigation

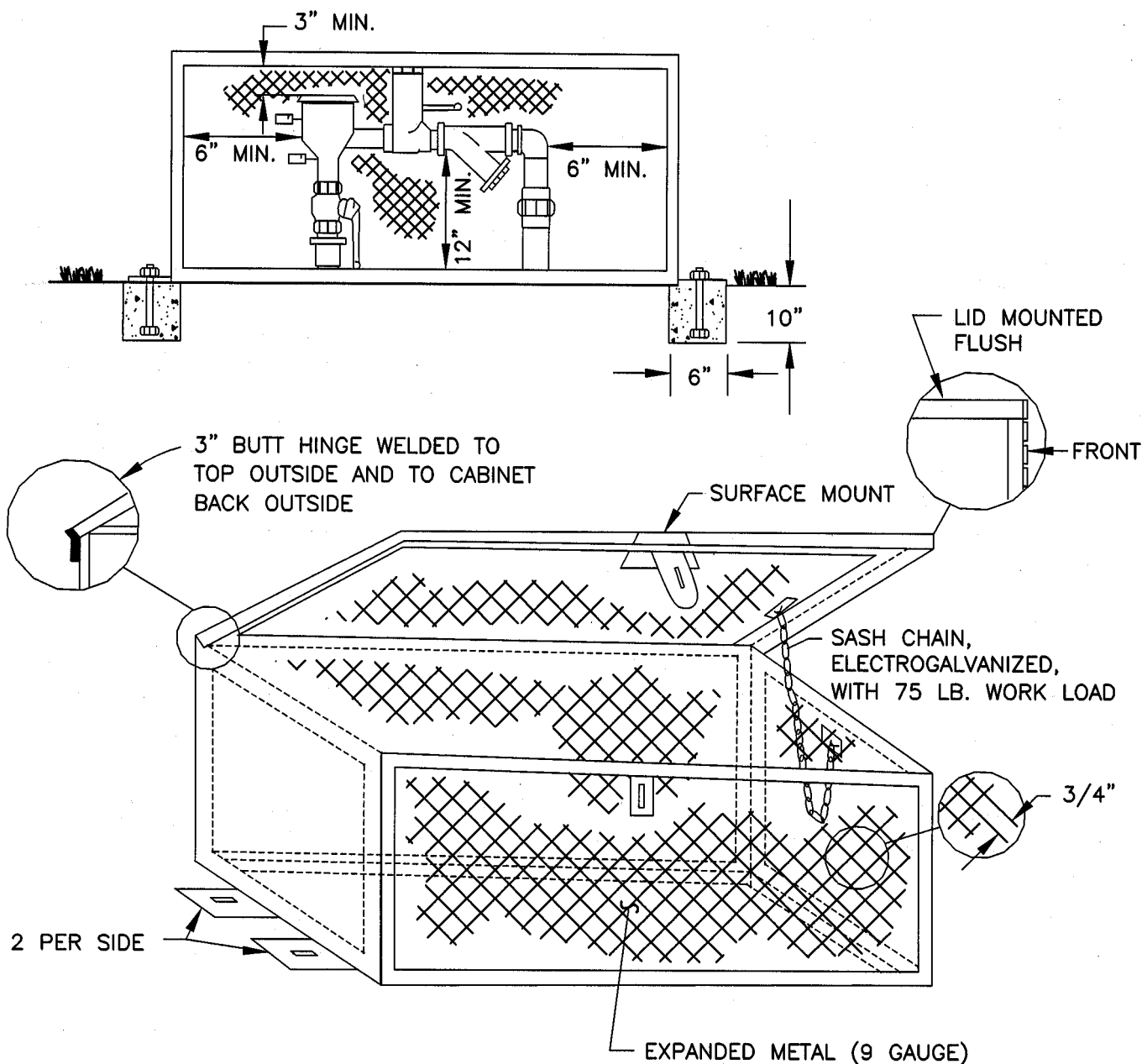
PRESSURE VACUUM-BREAKER ASSEMBLY

DETAIL. NO.

LS11

NTS





NOTES:

1. 1/2" X 8" CADMIUM PLATED BOLTS.
2. PRIMER : DUNN & EDWARDS GALV-ALUM RUST INHIBITIVE WHITE OR EQUAL.
3. PAINT: DUNN & EDWARDS ALKYD GLOSS ENAMEL:
IF IN GRASS USE CODE NO. 60-22 CYPRESS OR EQUAL.
IF IN GRANITE USE CODE NO. 60-14 BAJA WHITE OR EQUAL.
4. THERE SHALL BE A MINIMUM OF 6" BETWEEN THE PVB AND THE CAGE ON ALL SIDES.
5. TOP DOOR OF CAGE SHALL NOT OPEN MORE THAN 130°.

City of Chandler



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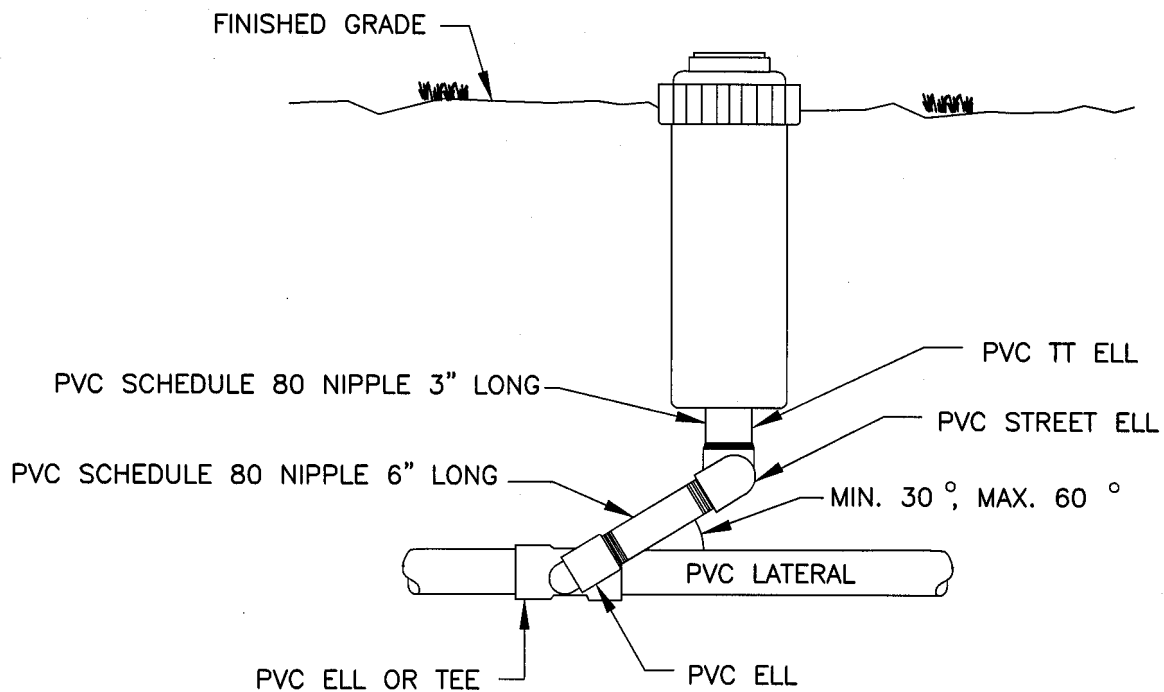
Guidelines for Landscaping and Irrigation

VACUUM BREAKER CAGE

DETAIL. NO.

LS13

NTS



NOTE:

1. INSTALL SPRINKLER 1" ABOVE GRADE UNTIL TURF IS ESTABLISHED THEN ADJUST FLUSH TO GRADE.

City of Chandler



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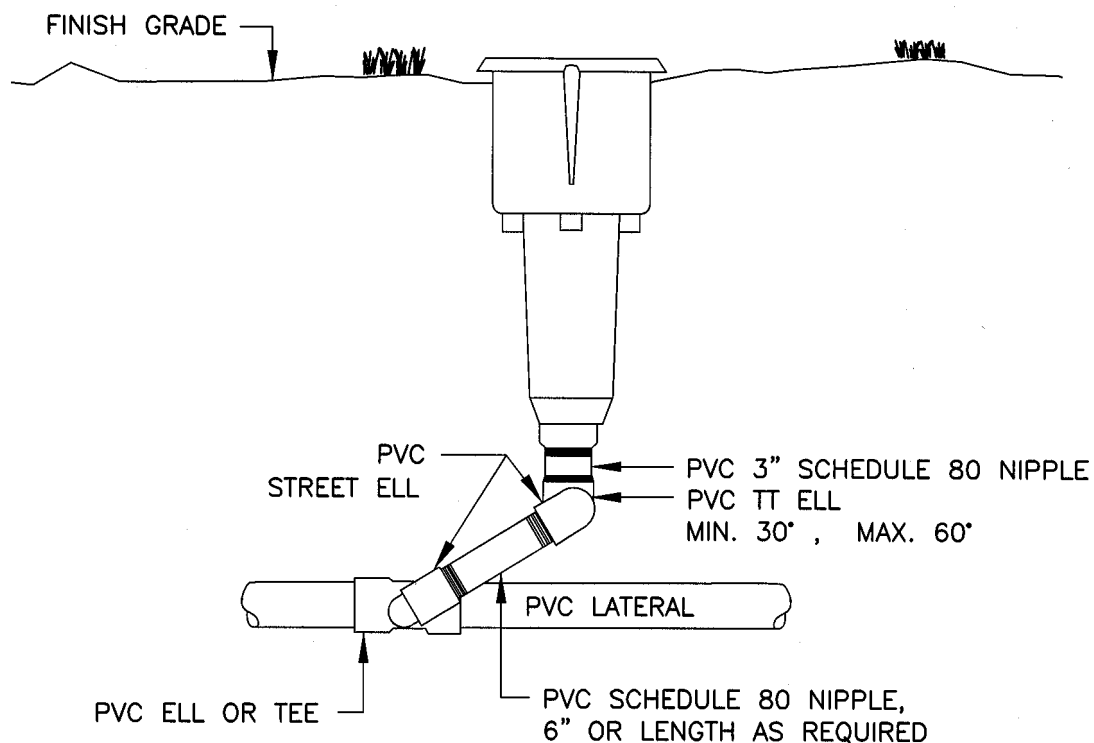
Guidelines for Landscaping and Irrigation

GEAR DRIVEN SPRINKLER

DETAIL. NO.

LS14

NTS



NOTE:

1. INSTALL SPRINKLER 1" ABOVE GRADE UNTIL TURF ESTABLISHMENT, THEN ADJUST FLUSH TO GRADE.

City of Chandler



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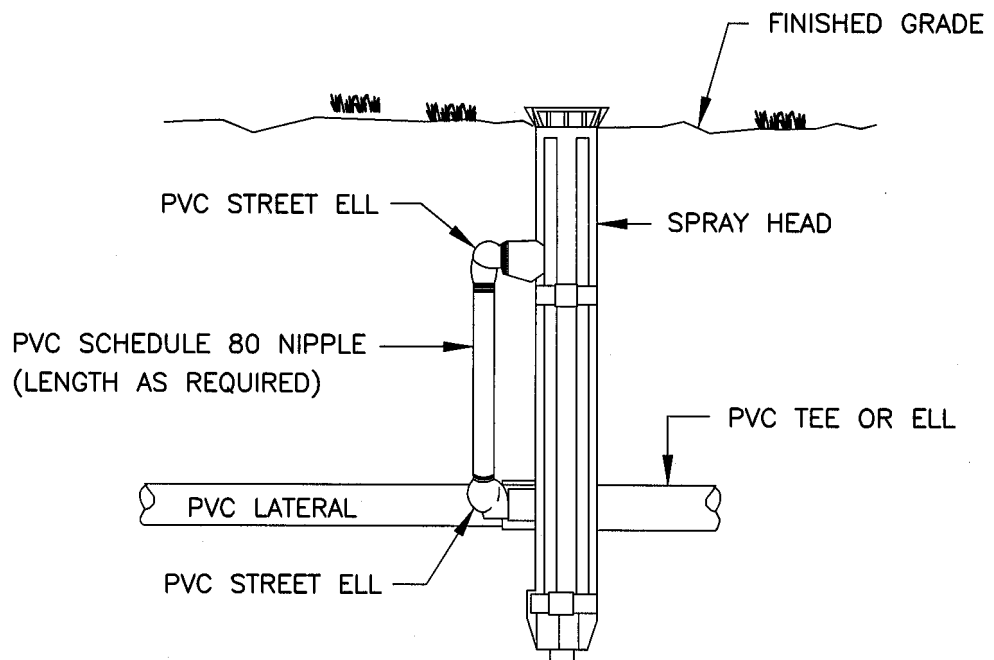
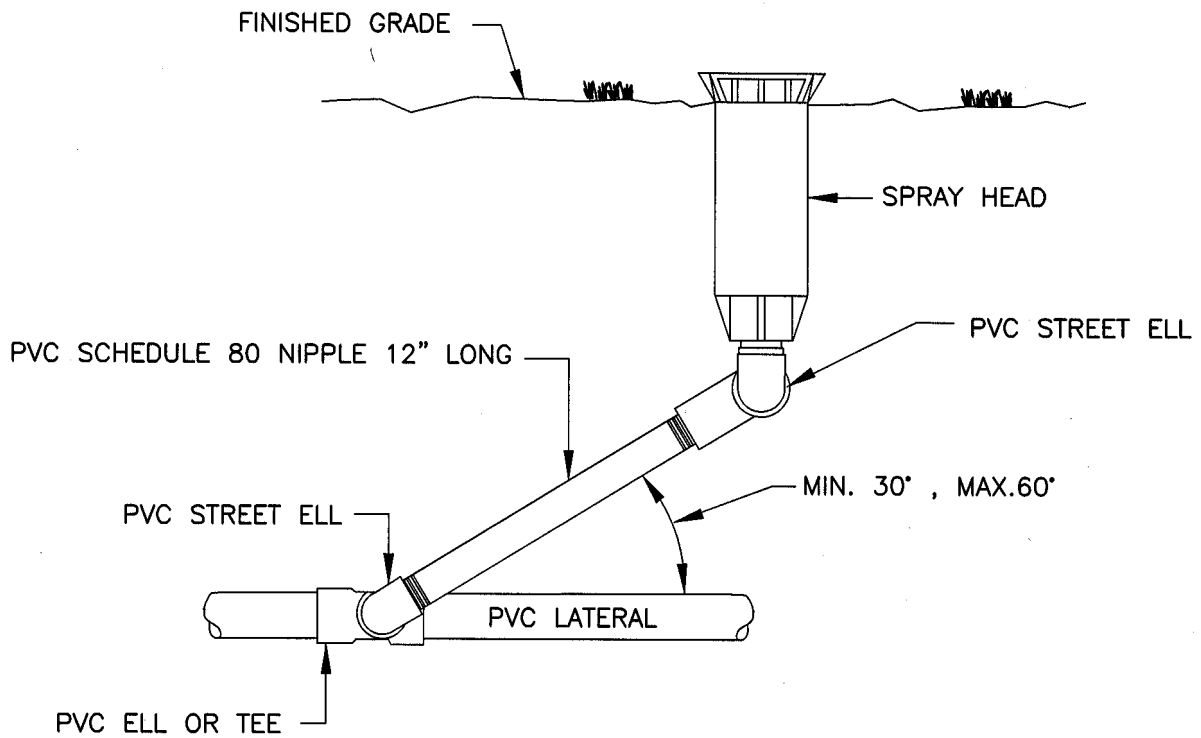
Guidelines for Landscaping and Irrigation

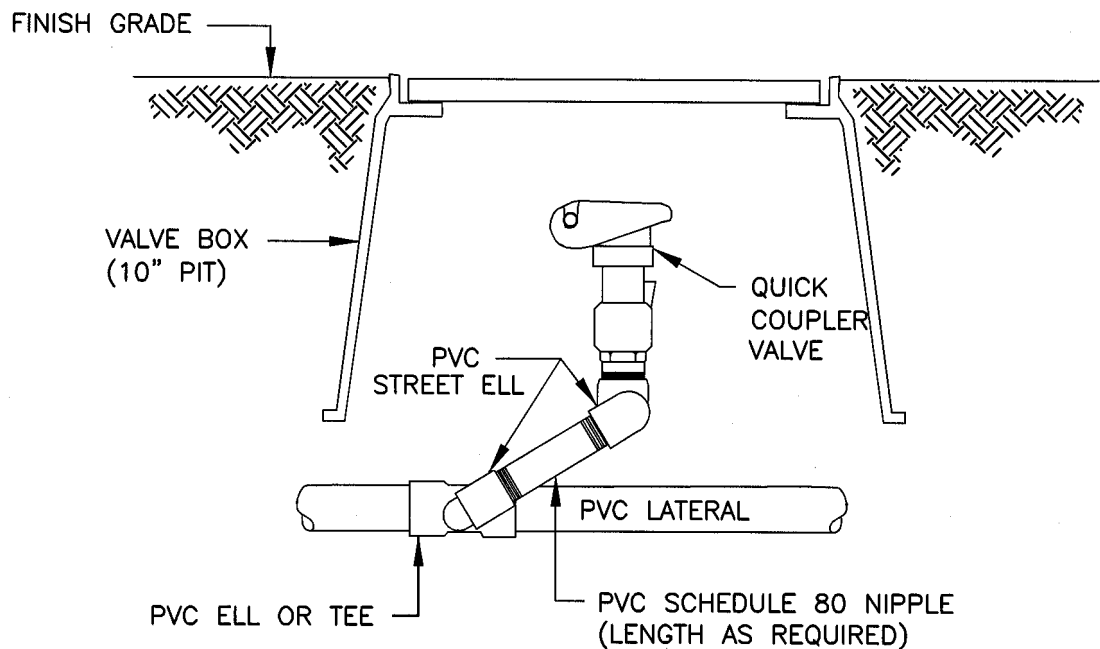
ROTOR POP-UP SPRINKLER

DETAIL. NO.

LS15

NTS





NOTES:

1. EACH QUICK COUPLER SHALL BE IN A SEPERATE VALVE BOX.
2. PROVIDE ONE (1) QUICK COUPLER KEY FOR EACH QUICK COUPLER VALVE.
3. PLACE 4" TO 6" DEPTH PEA GRAVEL UNDER VALVE BOX.
4. QUICK COUPLER SHALL HAVE LOCKING RUBBER COVER.

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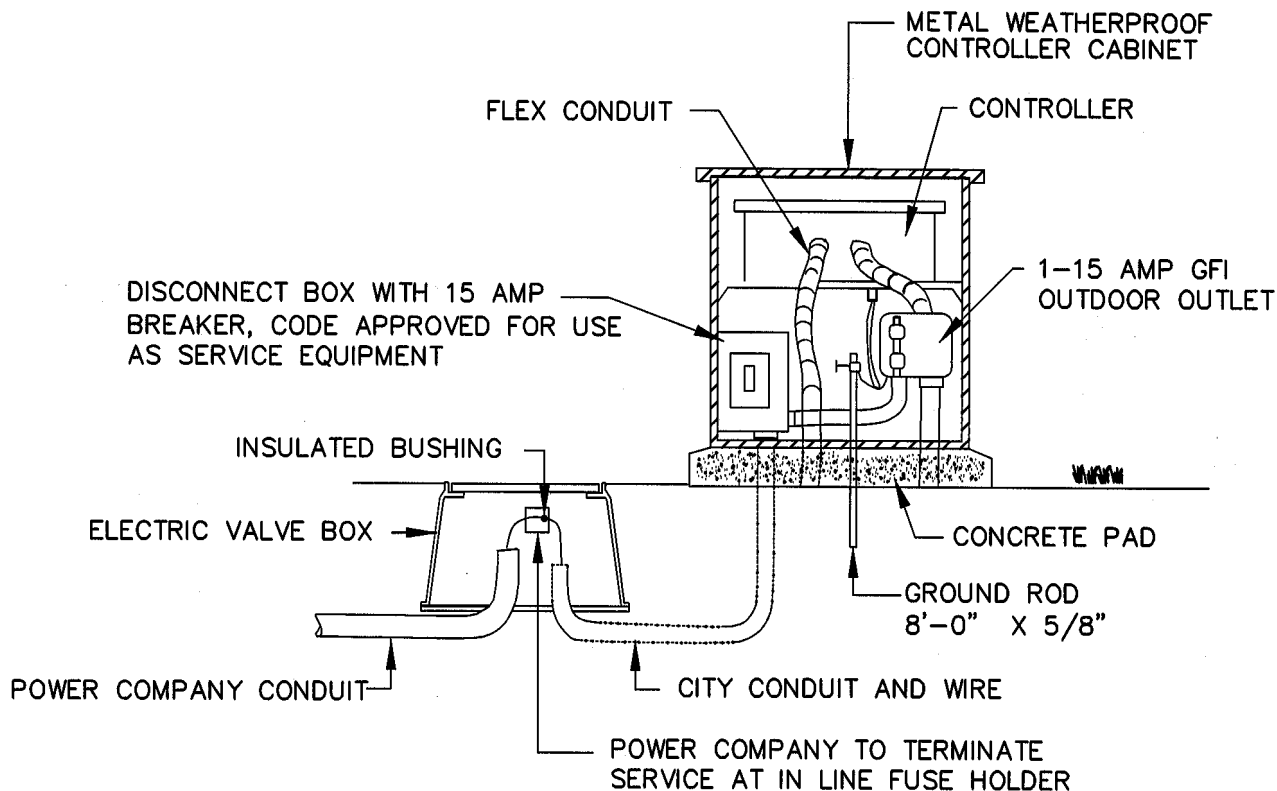
Guidelines for Landscaping and Irrigation

QUICK COUPLER

DETAIL. NO.

LS17

NTS



NOTES:

1. FUSE HOLDERS TO BE PROVIDED, BUSSMAN NO. HEB-AA IN LINE, WATERPROOF TYPE. FUSE TO BE BUSSMAN KTK OR EQUAL.
2. THE JUNCTION BOX SHALL BE PRECAST CONCRETE ADOT TYPE NO 3-1/2, WITH BOLT DOWN COVER, FLUSH MOUNTED.
3. THE JUNCTION BOX TO BECOME THE PROPERTY OF THE CITY OF CHANDLER LOCATED WITHIN 4' OF THE IRRIGATION CONTROLLER CABINET.
4. POWER COMPANY IS RESPONSIBLE TO PROVIDE SERVICE CONDUCTOR TO THE JUNCTION BOX.
5. METAL CONTROLLER CABINET TO BE MOUNTED ON CONCRETE PAD, CABINET TO BE PAINTED WHITE AND HAVE HASP AND LOCK TYPE, LOCKING DEVICE PROVIDED.
6. SEE DETAIL NO. 19 FOR ADDITIONAL DETAILS CONCERNING CONTROLLER CABINET INSTALLATION.

City of Chandler



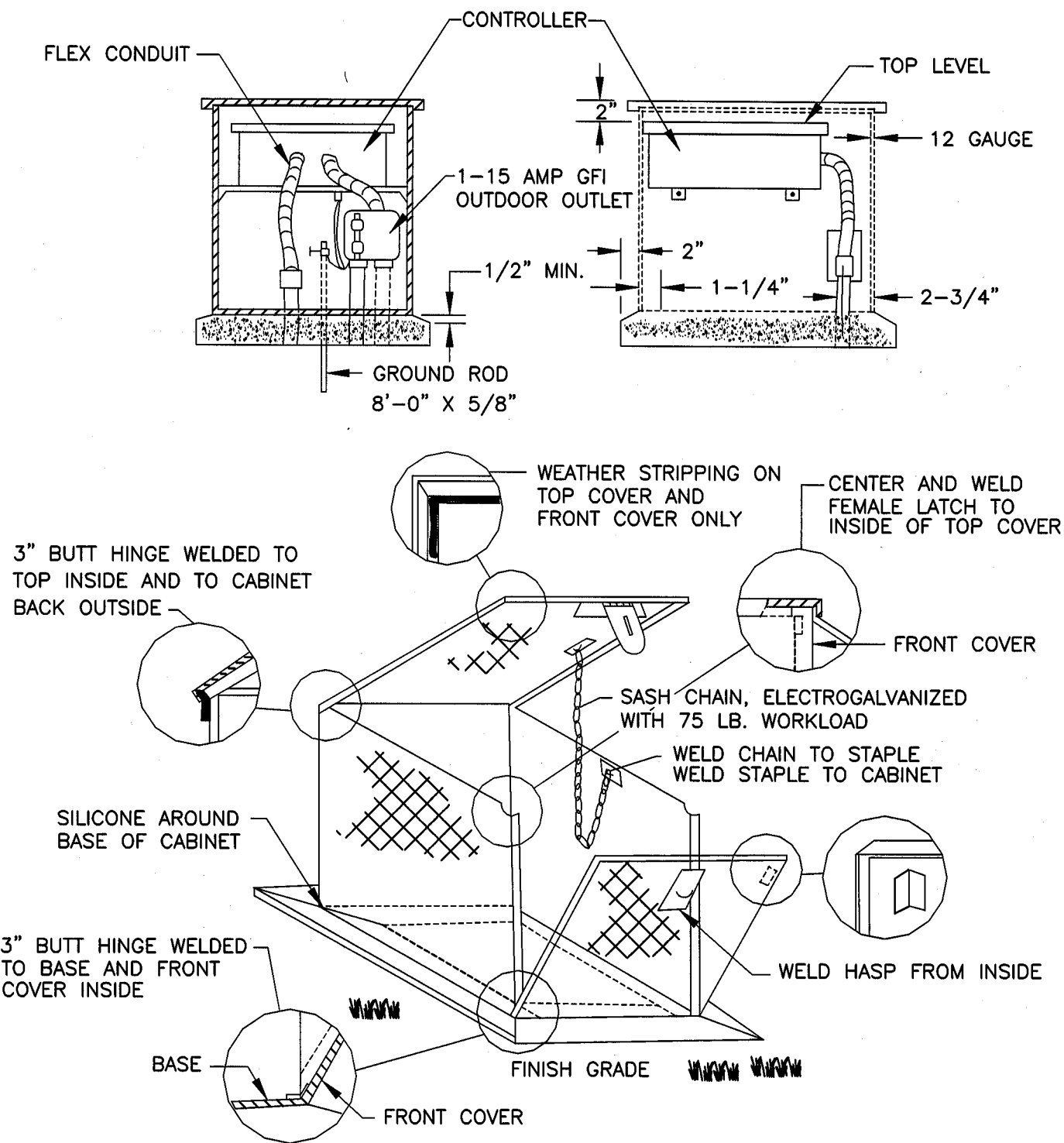
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Guidelines for Landscaping and Irrigation
NON-METERED ELECTRICAL INSTALLATION

DETAIL. NO.

LS18

NTS



NOTES:

1. PRIMER: DUNN & EDWARDS GALV-ALUM RUST INHIBITIVE WHITE OR EQUAL.
2. PAINT: DUNN & EDWARDS ALKYD GLOSS ENAMEL:
 IF IN GRASS USE CODE NO. 60-22 CYPRESS OR EQUAL.
 IF IN GRANITE USE CODE NO. 60-14 BAJA WHITE OR EQUAL.

City of Chandler



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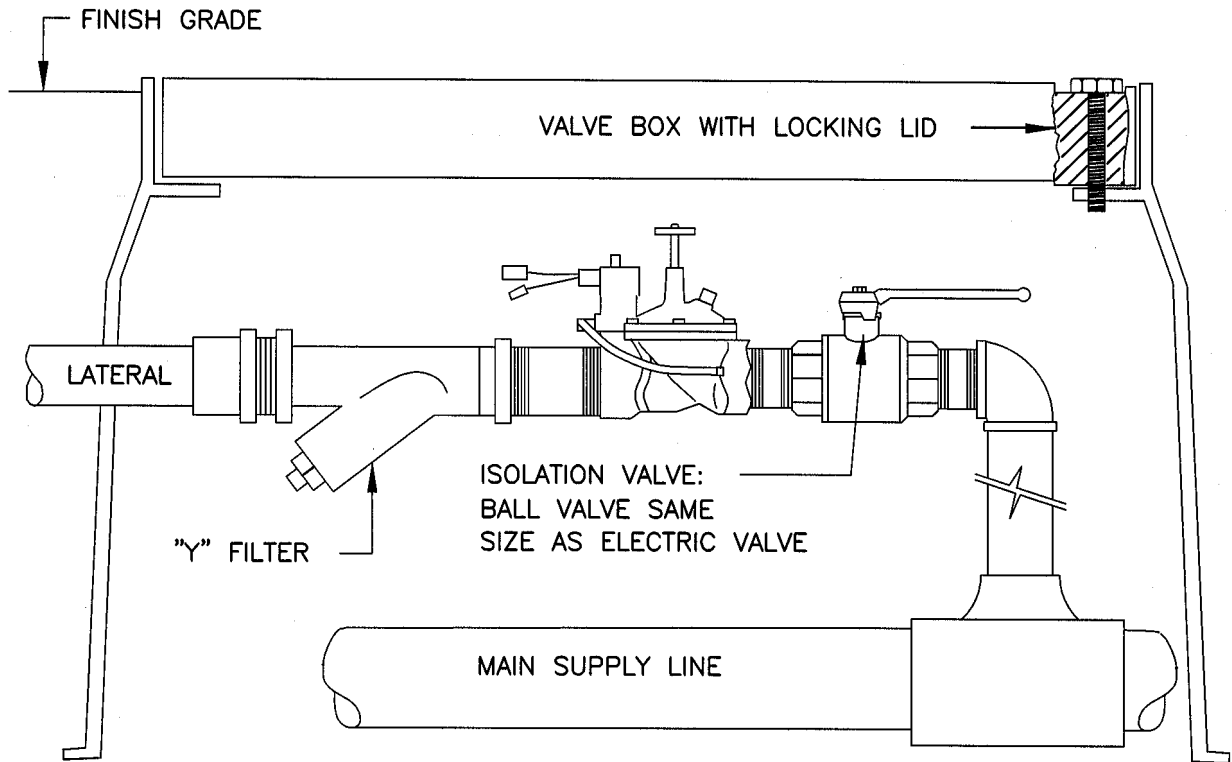
Guidelines for Landscaping and Irrigation

CONTROLLER SECURITY CABINET

DETAIL. NO.

LS19

NTS



NOTES:

1. PROVIDE EXPANSION COILS AT EACH WIRE CONNECTION.
2. QUICK COUPLERS SHALL BE IN SEPERATE VALVE BOXES.
3. PEA GRAVEL SHALL BE 4" TO 6" IN DEPTH UNDER VALVE BOX.

City of Chandler



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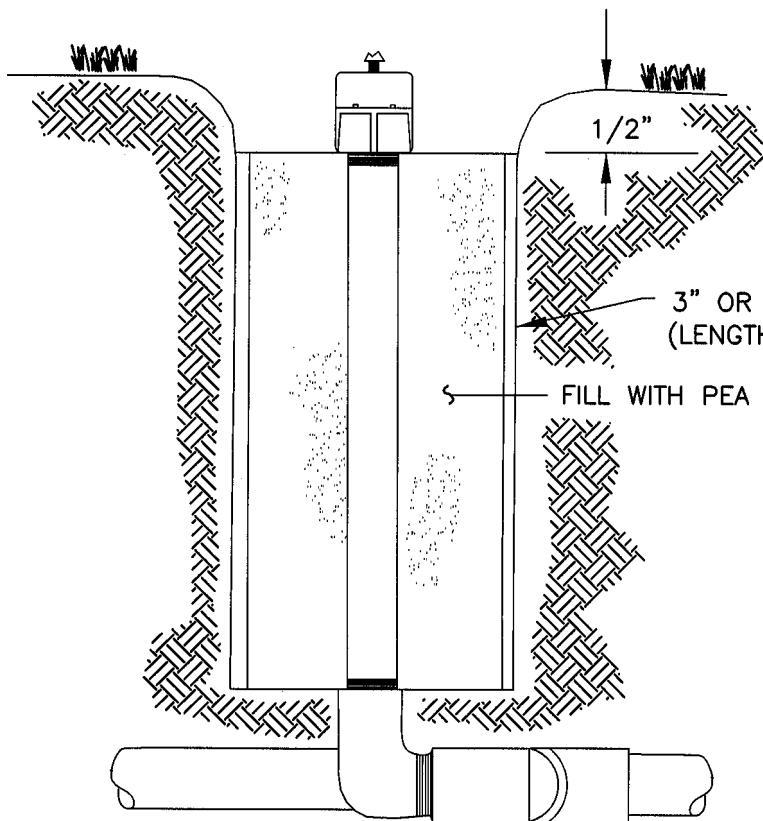
Guidelines for Landscaping and Irrigation

VALVE, REGULATOR AND FILLER DRIP SYSTEM

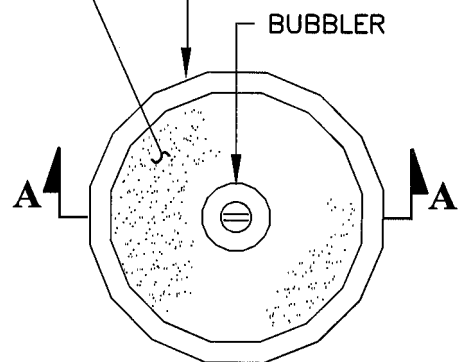
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LS20

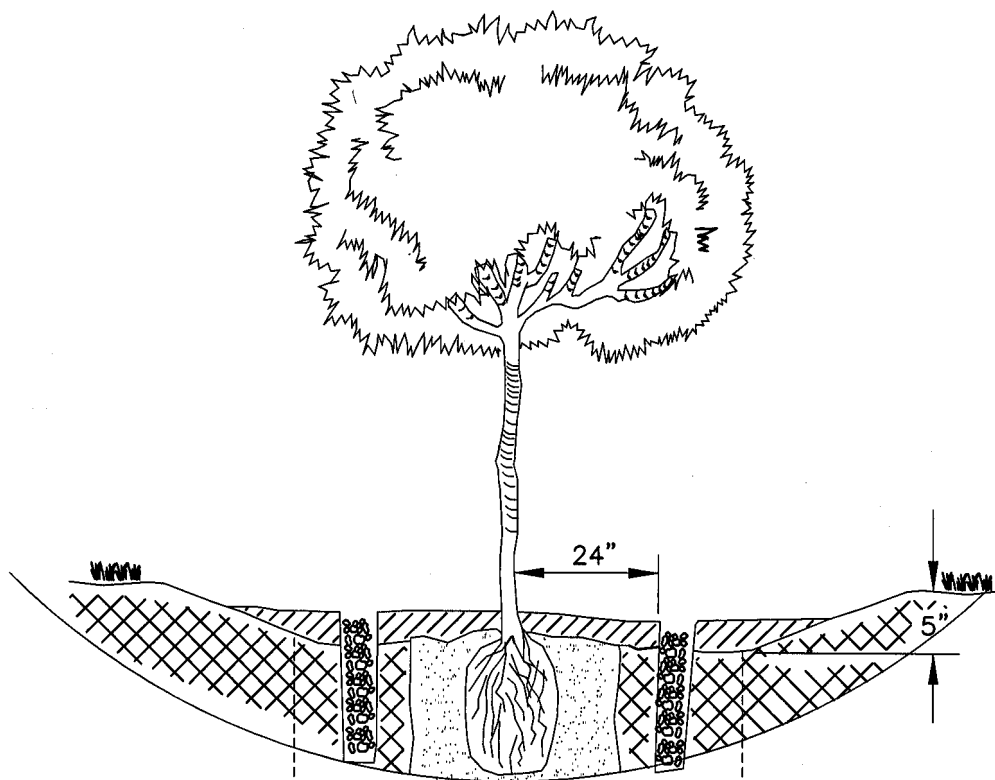
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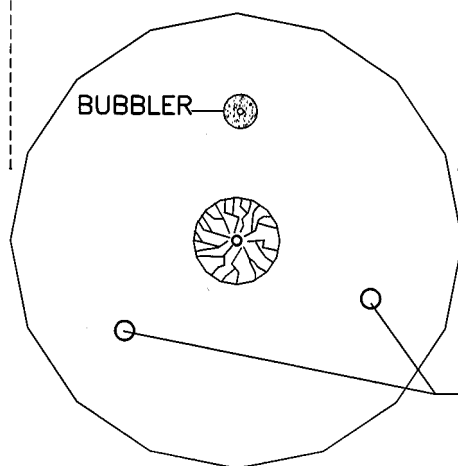
SECTION A - A



PLAN



SECTION



4" PERFORATED A.B.S. (12" LONG)
FILL WITH PEA GRAVEL

PLAN

City of Chandler



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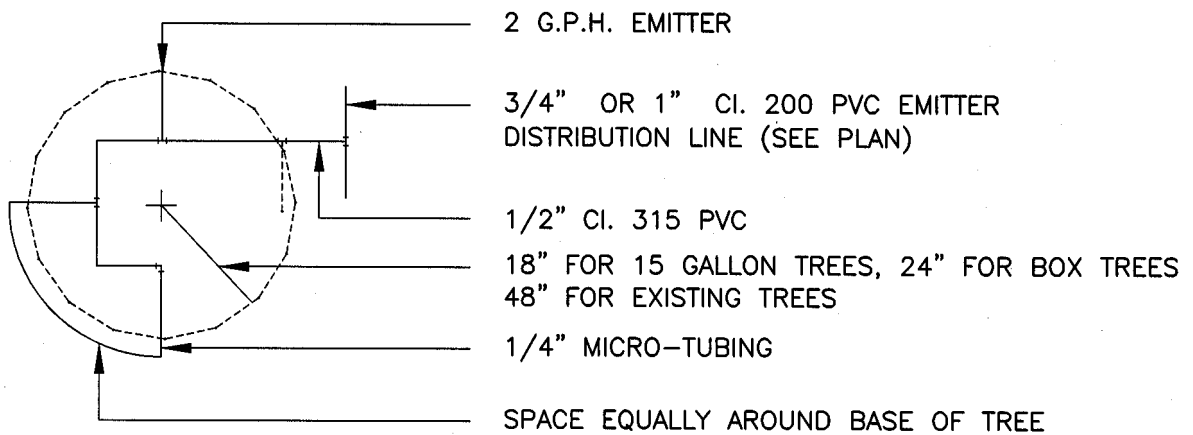
Guidelines for Landscaping and Irrigation

BUBBLER FOR TREES

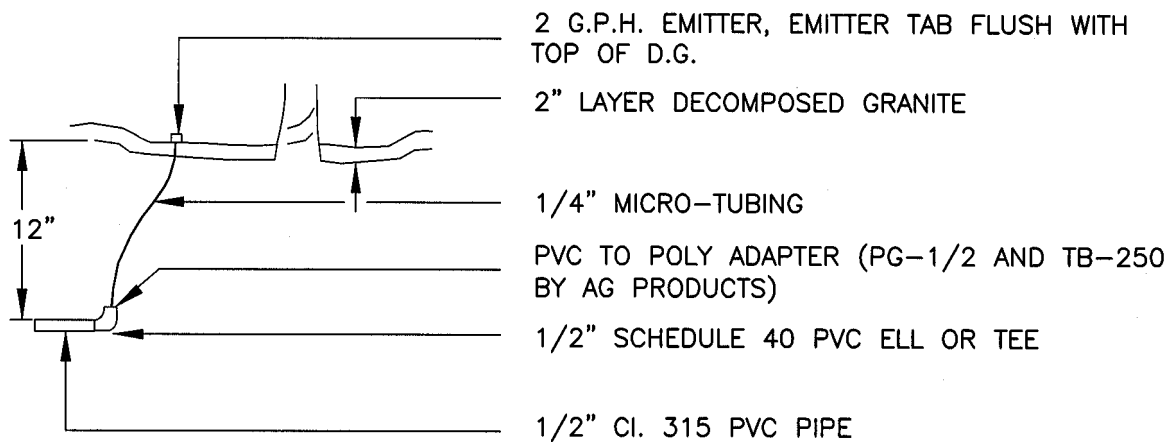
DETAIL. NO.

LS22

NTS



PLAN VIEW



SIDE VIEW

NOTES:

1. 15" GALLON TREES REQUIRE 4 EMITTERS.
2. 24" BOX TREES REQUIRE 6 EMITTERS.
3. 36" BOX AND LARGER TREES REQUIRE 10 EMITTERS.

City of Chandler



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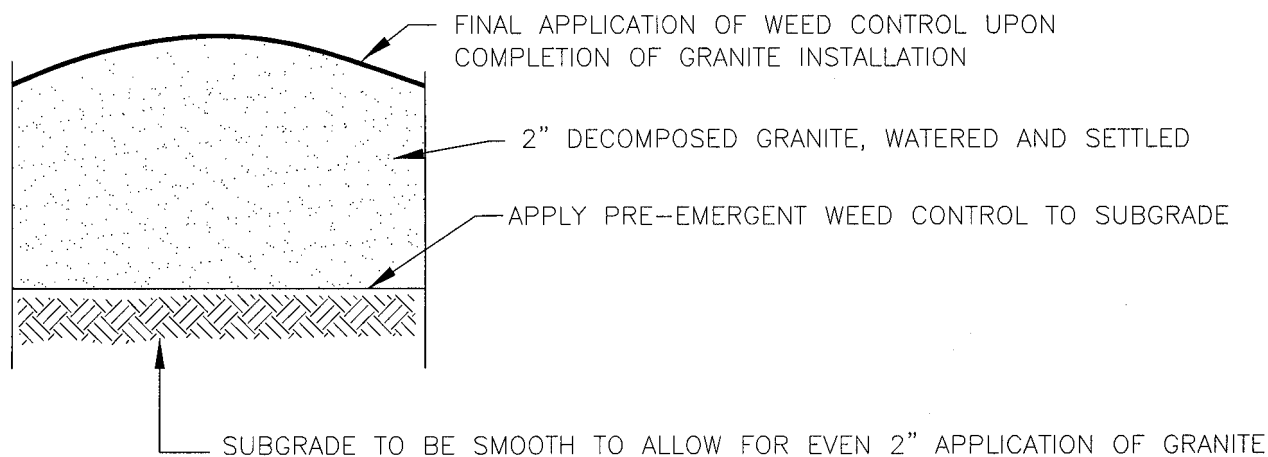
Guidelines for Landscaping and Irrigation

TREE EMITTER DRIP SYSTEM

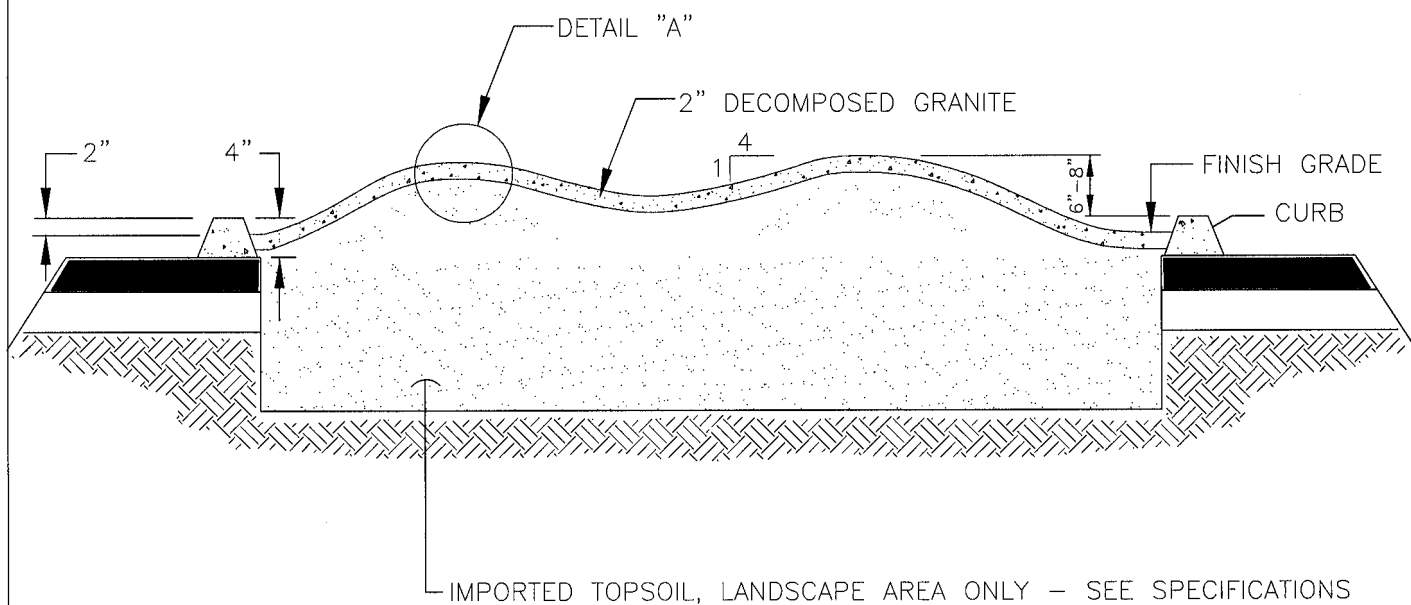
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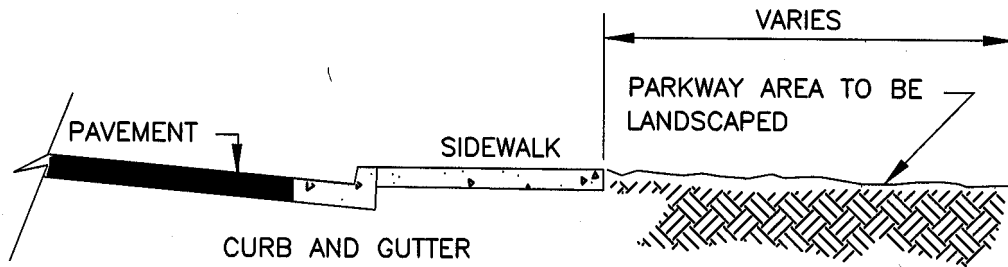
LS23

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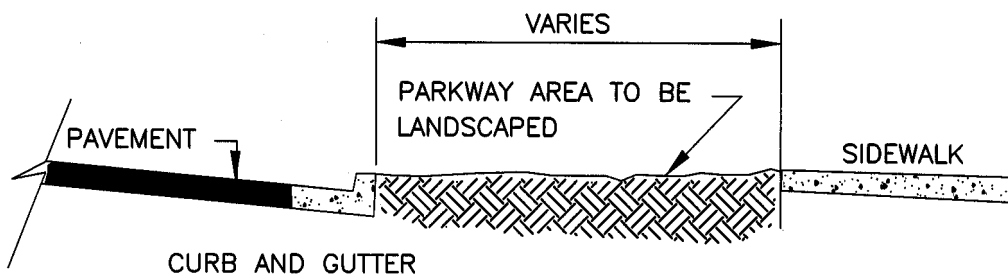


A GRANITE DETAIL

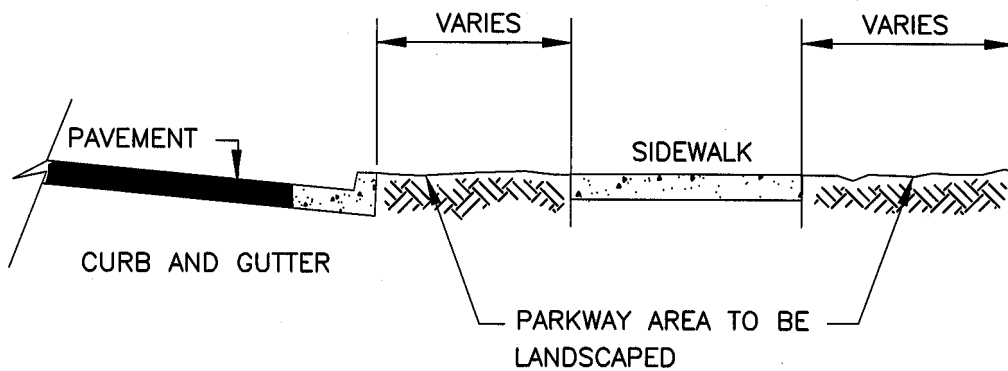




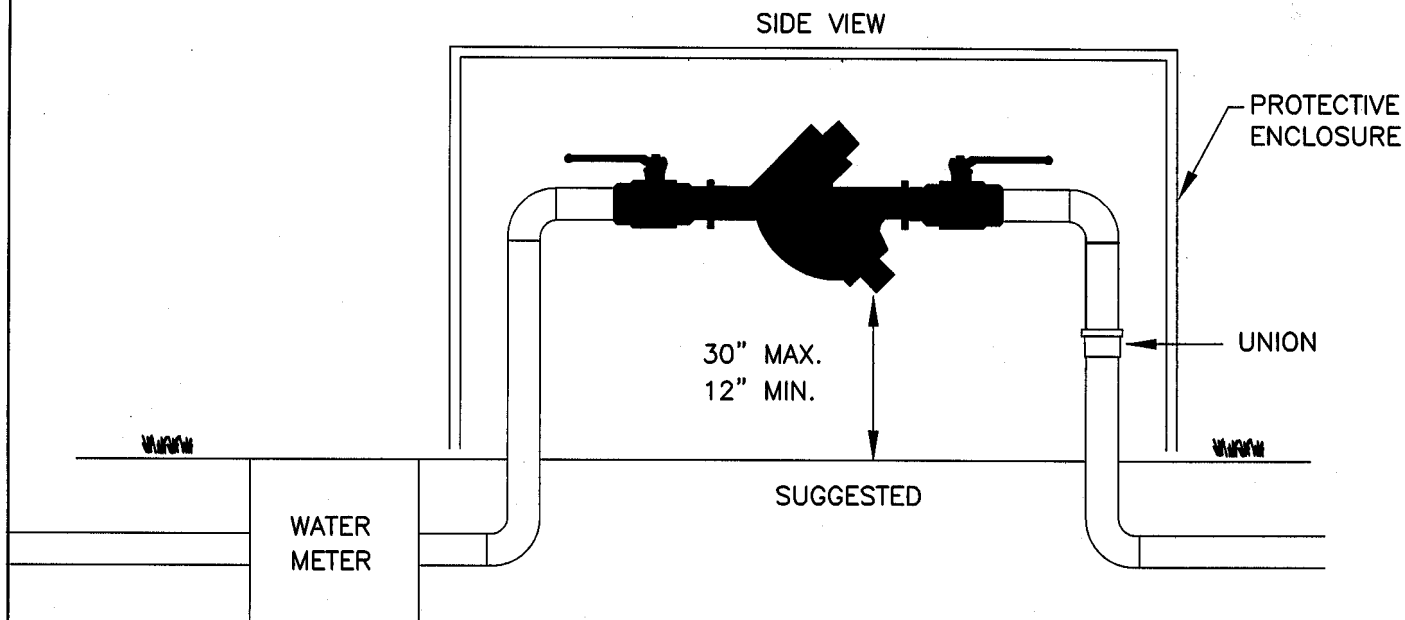
APPROVAL REQUIRED



APPROVAL REQUIRED



APPROVAL REQUIRED



NOTES:

1. INSTALL WITH MINIMUM CLEARANCE OF 12" FROM THE PORT, FLOOR, OR GRADE. INSTALL FOR EASY ACCESSIBILITY.
2. USE TYPE 'K' COPPER.
3. UNION SHALL BE WITHIN 12" OF UNIT.
4. USE BALL VALVES.
5. DEVICE SHALL BE APPROVED BY USC FOUNDATION FOR CROSS CONNECTION CONTROL AND HYDRAULIC RESEARCH.

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Guidelines for Landscaping and Irrigation

REDUCED PRESSURE

DETAIL. NO.

LS26

NTS